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AUGUST 1954
VOLUME 60 NUMBER 2

Published Monthly by
AMERICAN MEDICAL ASSOCIATION
535 NORTH DEARBORN STREET • CHICAGO 10, ILLINOIS

Entered as Second Class Matter Jan. 14, 1925, at the Postoffice at Chicago, Under the Act of March 3, 1879. Annual Subscription, $12.00

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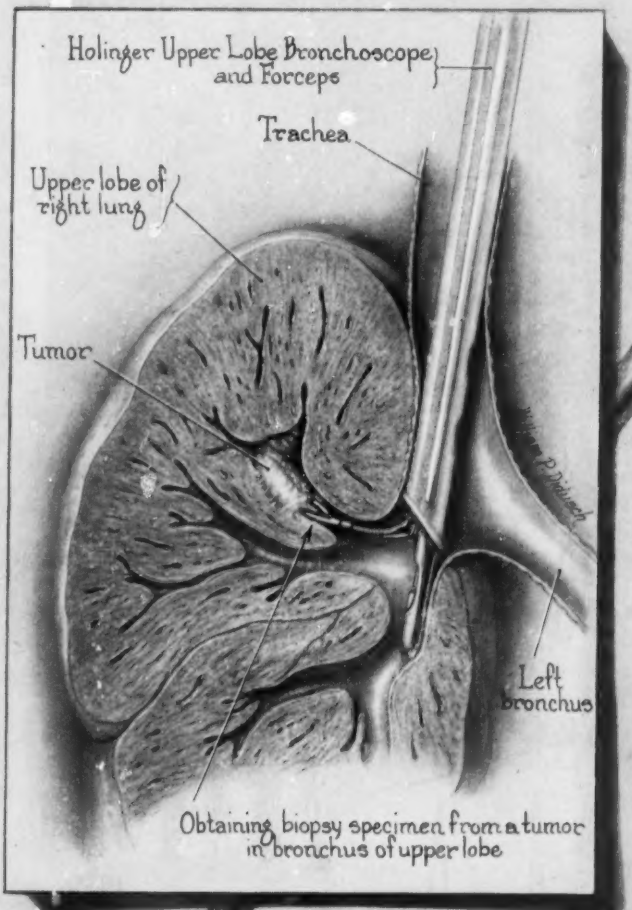
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MORPHOLOGIC CHANGES IN THE MASTOID BONE UNDER ANTIBIOTIC THERAPY

MARVIN J. TAMARI, M.D.
AND
PAUL B. SZANTO, M.D.
CHICAGO

IT IS WELL known that the clinical course of otitis media is changed by the use of the various antibiotics. However, the correlation of the altered clinical course with the histopathologic changes has not received wide attention. Very often clinically the phenomenon of "masking" characterizes otitis media under antibiotic treatment—and in clinical terms, "masking" describes that phase of latency in regard to signs and symptoms which is observed prior to either resolution or complication. But what is the histopathologic picture during this period of latency?

In seeking an answer to this question, we examined two sources of information. Those cases which in spite of antibiotic therapy came to surgery constituted a direct approach. For comparison, sections of infected mastoids not operated on and sections of bone material not influenced by antibiotics have been studied.

However, masking and latency were well-known clinical entities prior to the use of chemotherapeutic and antibiotic agents. Examples of the characteristics of clinical latency are to be found in the so-called latent otitis media of infants, in serous otitis media, in tuberculous otitis media of infants and young children, and in the classic example in the preantibiotic era, the Type 3 Diplococcus pneumoniae otitis. Thus a consideration of the histopathologic findings of these infections was made for correlation.

In latent otitis media of infancy the clinical picture is predominated by the generalized symptoms; ear symptoms are minor. The drum membrane is dull, lusterless, and slightly bulging and presents little inflammatory change. Surgically, one finds a relatively large antrum filled by a mucopurulent plug. Microscopically, the spongy diploetic periantral bone shows lymphocytic infiltration in the marrow tissue, hyperplasia of the fibrous elements of the mucoperiosteum, bone erosion, and some scanty new bone formation. The middle-ear mucosa is also thick and edematous and occasionally shows remnants of incompletely absorbed gelatinous mesenchyme (Fig. 1).

In serous otitis media the presence of fluid in the mastoid cells may not become obvious for very long periods of time, especially if the patient has a previous hearing loss. During the prolonged course, fluid in the mastoid cells causes osteoclasis, new bone formation, and eventually sclerosis. From this histologic picture it appears that the lack of significant increase in pressure plus the

Read before the Chicago Laryngological and Otological Society, April 5, 1954.

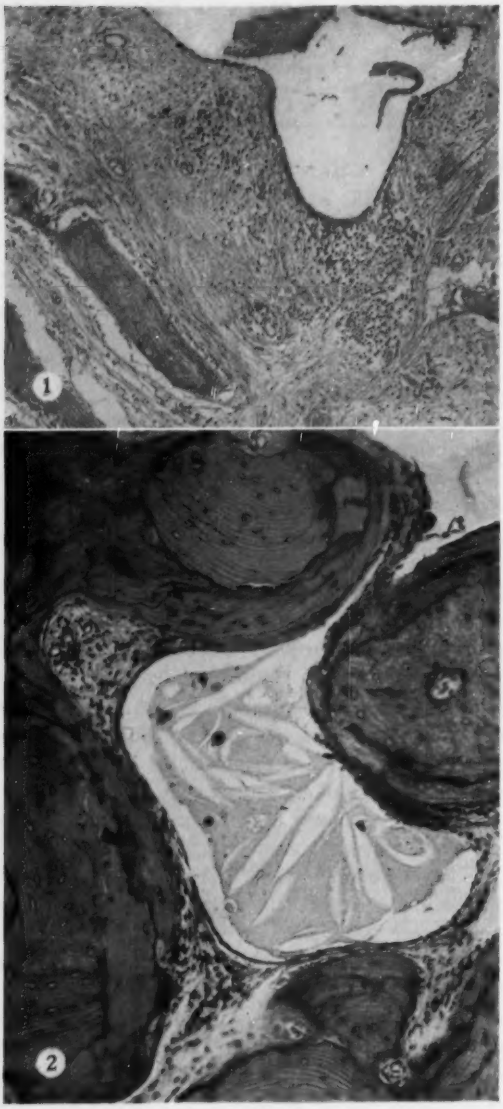


Fig. 1.—Latent otitis in a 5-month-old infant. Section shows scanty secretion in a constricted cell, lymphocytic infiltration in the fibrotic subepithelial layer, and new bone formation.

Fig. 2.—Masked serous otitis media. Cell lumen is filled with a brown-tinted exudate containing Russell cells and cholesterol crystals. New bone is distinctly separated from the old by cementing lines.

absence of a significant inflammatory reaction may account for the masking. It is only secondary infection that may interrupt the latency and produce a manifest mastoiditis (Fig. 2).

In tuberculous otitis media in infants and children there is a slow production of granulations behind the intact thickened drum. At the onset, giant and epithelioid cells are lacking and the scanty exudate is composed of lymphocytes, histiocytes, and a few neutrophiles. It is this histologic state that constitutes the clinical latent period prior to the progressive phase (Fig. 3).

The most typical preantibiotic latent otitis media and mastoiditis was the Diplococcus pneumoniae (Pneumococcus) Type 3 infection. Clinically, the onset of this infection follows a conventional acute pattern. Spontaneous perforation or paracentesis is followed by a rapid sealing and a subsequent meaty consistency of the drum. Except for hearing loss and occasional tinnitus, the patient is asympto-

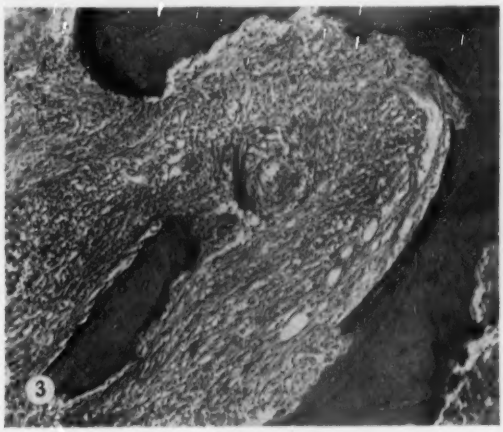
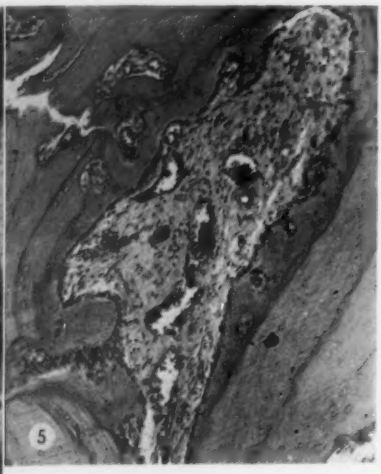


Fig. 3.—Asymptomatic latent tuberculosis of the mastoid in a 7-year-old boy. Note fibrous elements and lymphocytes in a cell cavity. Bone sequestra and erosions indicate recent rarefaction.

matic until resolution or complication occurs. The histological course occurs in several phases, which may be broadly described as a pronounced proliferative response with early connective tissue infiltration. Specifically, the initial phase is that of inflammatory change, which is characterized by moderate edema of the mucoendosteum and the appearance of a scanty mucous exudate. Both edema and exudate show an early tendency toward organization, and when this organization occurs near the window niches or the ossicular chain it may account for protracted loss of hearing. In the mastoid cells the initial phase is not symptomatic and blends into the next phase—that of rarefaction. With no great pressure against the bony elements, rarefaction occurs slowly and in all directions. This occurs not only within the mastoid cell septa but also in perivascular channels in the marrow tissue spaces, along which it may extend to reach the lateral sinus, dura, or labyrinth. It may also proceed toward the mastoid cortex. While no great build-up of pressure occurs, this rarefaction would further prevent a crea-

tion of pressure and enhances the phase of condensation. The condensation phase is seen in the areas of exudate and edema and is characterized by fibrous tissue formation. Filled with fibroblasts, lymphocytes, and new capillaries, the mastoid-



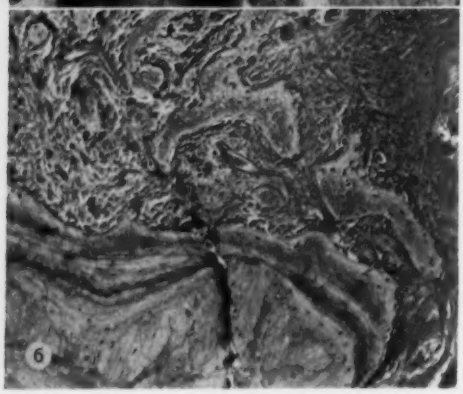


Fig. 4.—Latent mastoiditis due to Diplococcus pneumoniae Type 3 infection. Note cell lumina filled with fibrous tissue, new bone and osteoid apposition at the bony wall, and rootstock bone in the center of the cell.

Fig. 5.—Masked otitis treated with antibiotics (penicillin, streptomycin, and chlortetracycline [Aureomycin]) in a 7-year-old boy. Section from a periantral cell shows complete fibrosis of the cavity and narrowing of the lumen through abundant new bone formation.

Fig. 6.—Masked otitis treated with antibiotics. Section from the cortex showing an exuberant new rootstock bone formation.

cell lumen thus simulate a secondary marrow-tissue space, and the next phase, that of new bone formation, begins.

Ossification begins at two sites: at the mastoid-cell wall and also within the accumulated fibrous tissue which fills the mastoid-cell lumen. Fibrous tissue is condensed, and collagen is formed. Next, osteoid tissue appears, and the new bone is recognized by its staining properties and the presence of relatively larger osteocytes. In its rapid growth, the new bone seems to close off small spaces,

which retain their marrow-like characteristics. The newly formed bone is thus prepared for either of two courses—either repneumatization or complete obliteration, depending upon the activity of the newly formed osteoblasts or the reaction within the new marrow spaces.

To summarize the histopathologic course of the Diplococcus pneumoniae Type 3 otitis media, there is an initial phase of edema and scant secretion, a rarefaction of bone, condensation of organized fibrous tissue, and, finally, ossification. The ossification may progress to sclerosis, persist as diploic bone, or actually undergo repneumatization.

Our knowledge of such phases has been derived from those cases which progressed to surgical indications. There are a large number of instances in which spontaneous healing has occurred, and in infections other than those with the Diplococcus pneumoniae Type 3 spontaneous healing is the rule. Instead of the steps outlined above, the accumulated cellular and fibrinous exudate undergoes a liquefaction and becomes absorbed through the enlarged vascular channels. The mucoendosteum shrinks to its previous state but in some instances and some locations, such as in the bone niches of the middle ear proper, may remain thick and cause loss of hearing. In other instances, depending on local and general resistance compared with the virulence of the infecting organism, the acute otitis media may become chronic.

In order to make a comparable histologic evaluation of middle-ear and mastoid changes which occur in those cases treated with antibiotics, we have studied bone chips removed from mastoids at the time of surgery in such cases as have advanced to surgical indications in spite of therapy. Various phases of reaction occur in such specimens, and so we feel that we can also gain information about the type of reaction which occurs in cases which do not come to surgery.

At the onset of infection under antibiotic treatment there is a phase of congestion and edema followed by a phase of rarefaction. This rarefaction period seems to be of very short duration, as one can detect the presence of osteoclasts only in a few of the peripheral mastoid cells. The lumina of the mastoid cells become reduced very early as a result of the marked fibrous reaction within the endosteum. Also, the break-through of the epithelium is distinct very early in the inflammatory phase, and the elements which fill the mastoid cells are fibrous in character, showing a preponderance of lymphocytes. There is an early condensation of collagen; ribbons of osteoid and abundant osteoblasts are seen under the endosteum as well as in the center of the cell.

Thus, aside from the factor of clinical latency, one sees certain histologic similarities between antibiotic-treated otitis and Diplococcus pneumoniae Type 3 infection. Congestion and edema, rather than a true inflammation, are the early response. Insignificant rarefaction of underlying bone, marked fibrous reaction, lymphocytic infiltration, and new bone tissue formation further mark the histologic identity.

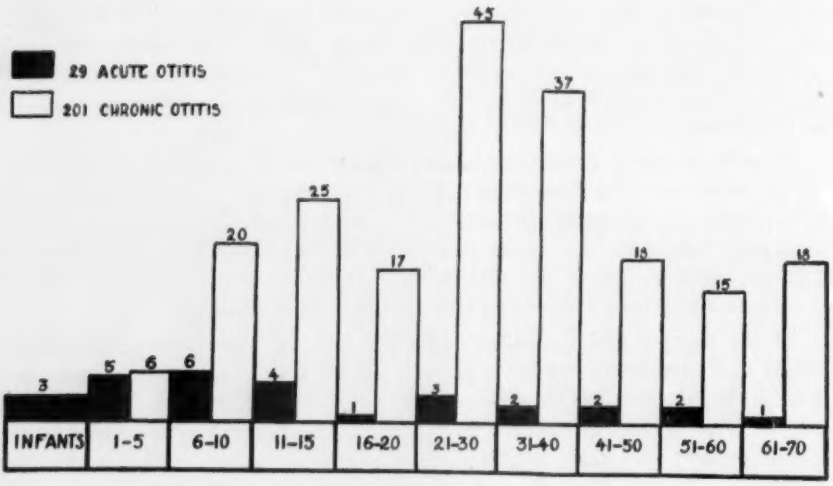
The period of rarefaction is in both instances shortened or even absent. The ramification of the newly formed reticular bone represents a formation known as the rootstock bone, which, in both varieties, may lead to a complete obliteration of the original pneumatic cavity.

It is assumed that the histopathological changes result from the presence of antibiotics and their enzymatic action. They may actually produce a local leucopenia. Thus the neutrophiles seem to disappear before the initial fibrinous exudate has been dissolved, and the exudate itself seems to stimulate the fibroblastic reaction.

It was also found that in cases of Diplococcus pneumoniae Type 3 infection, the fibrosis and lymphocytic infiltration persist as long as the cocci retain their capsule and a "slime layer" surrounding it. The capsule itself and the "slime

Table 1.

DISTRIBUTION OF ACUTE AND CHRONIC OTITIS MEDIA ACCORDING TO AGE



STATISTICS OF SURGICAL PROCEDURES AT THE EYE AND EAR INFIRMARY (1950-1953)

layer" consist of polysaccharides and are resistant to phagocytosis. With the loss of the "slime layer," which occurs in aging maturation and mutation, the cocci may become ingested, and the mechanism of phagocytosis can be observed.[1]

With the correlation of the clinical and histopathologic observations, a clinical classification based on morphological and pathological manifestations of antibiotic-treated otitis can now be considered. In the past five years three types of the clinical course of treated otitis media have been observed:

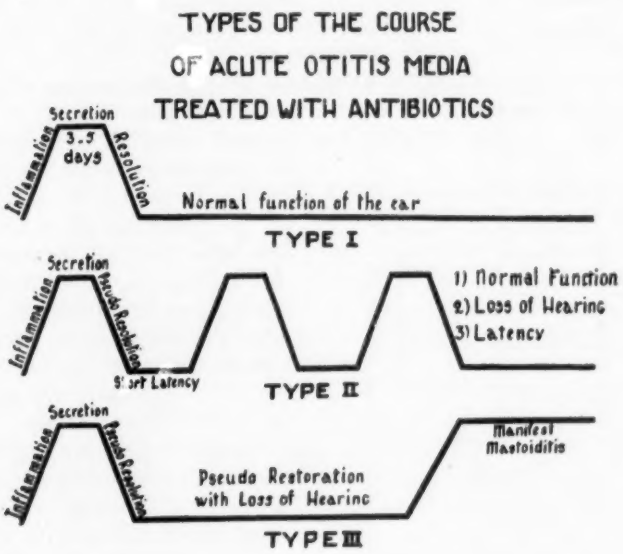
1. Type 1, in which adequate antibiotic therapy has been given early in the disease and drainage has been established, either spontaneously or by paracentesis. The acute otitis subsides after four or five days, with the return of normal function (Table 1).

2. Type 2, in which there may be a protracted course when the administration of antibiotics is insufficient in dose or duration. There may be intermittent discharge, and the otitis may subside, leaving a marked, permanent hearing loss.

3. Type 3, in which, if the early antibiotic treatment controls the symptoms and is discontinued early, the otitis may pass into a state of latency similar to that of the Diplococcus pneumoniae Type 3 infection. These cases usually had a surgical outcome because of extensive destruction or complication.

Those in Types 1 and 3 have a favorable outcome—spontaneous or surgical resolution. One cannot predict the outcome of those cases which have a protracted course with extensive scarring following poorly administered antibiotics. However, if one compares the ages of the patients and the type of surgery which is being done in the antibiotic era with those of the period prior to their use, one

Table 2.



finds that now more younger patients are undergoing surgical care for chronic changes than in the past. The series of cases, however, is not sufficient to draw any general conclusion at this time (Table 2).

SUMMARY

Masking of symptoms or latency in otitis media can occur in the course of otitis in infants, serous otitis media, tuberculosis, acute otitis media caused by Diplococcus pneumoniae (Pneumococcus) Type 3, and otitis media treated with antibiotics.

The histopathological changes in masked otitis are characterized by a presence of abundant fibrous exudate in the pneumatic-cell lumina and in the adjacent marrow-tissue spaces. It consists mainly of fibroblasts, histiocytes, plasma cells, and collagen, in contrast to the polymorphonuclear leucocytic accumulation in the trivial form of otitis media.

The Diplococcus pneumoniae Type 3 otitis and the otitis treated with antibiotics exhibit identical changes. In both instances abundant fibrosis prevails. Production and condensation of collagen are in the foreground. The pneumatic cells become constricted by formation of new bone at the walls of the cell and composition of rootstock bone in the center of the cell. The period of bone rarefaction appears shortened or absent. In Diplococcus pneumoniae Type 3 infection, the latency becomes interrupted with the disappearance of the "slime layer" of the capsulated coccus; in otitis treated with antibiotics, it becomes manifest through a superinfection or reactivation of resistant strains and yet unknown enzymatic action.

The clinical course of otitis treated and influenced by antibiotics is entirely different from the course of the trivial otitis. The period of latency may extend for weeks and months and usually becomes manifest with symptoms of intracranial involvement.

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MENIÈRE'S DISEASE TREATED BY PORTMANN'S OPERATION

Report and Clinicopathological Study of a Case

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THE SUBJECT of this communication, a woman of 50 years, was first seen in April, 1948. She then gave a history of one month's duration of attacks of rotational vertigo preceded for some months by increasing deafness of the right ear accompanied, since the onset of vertigo, by a continuous humming tinnitus in the right ear.

Examination of the ears, nose, and throat revealed nothing abnormal. Roentgenological examination of the paranasal sinuses showed mucosal thickening within the right antrum, which was washed out with negative results.

Pure-tone audiometry, carried out in May, 1949, gave the result shown in Figure 1. Tuning-fork tests showed the deafness of the right ear to be of the perceptive type, the Weber test being referred to the left, with a false negative Rinne test on the right mastoid. There was no spontaneous or positional nystagmus, and the caloric tests gave the results shown in Figure 2. It will be seen that there was a well-marked abnormality in the pattern of the responses, indicative of a lesion of the right labyrinth.

During the next two years the vertigo continued to be very troublesome and resisted the usual forms of medical treatment, including histamine injections.

On Jan. 3, 1950, Portmann's operation was performed upon the right labyrinth, under nitrous oxide and oxygen anesthesia. The bone between the lateral

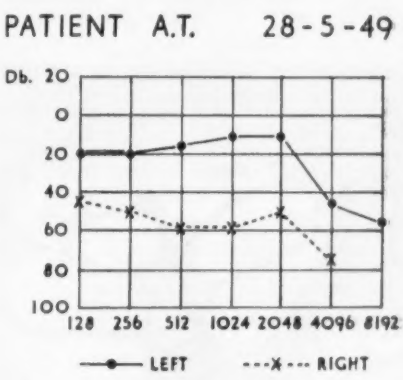

Figure 1

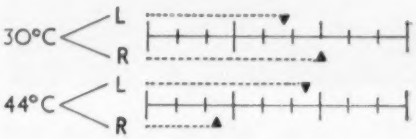

Figure 2

sinus and the posterior semicircular canal was removed and the dura elevated. After the separation of the dura from the fossette of the saccus endolymphaticus, an escape of clear fluid was observed

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at this point. Whether or not the fluid was cerebrospinal fluid escaping from a small dural tear or endolymph escaping from the divided saccus, it was impossible to say. The blood pressure was lowered during the operation, and a short period of cyanosis occurred half way through the procedure. After the operation the patient remained in coma and died three days later. The pupils remained small, with a left extensor plantar reflex. At necropsy no abnormalities discernible by the naked eye were found in the central nervous system. The temporal bones were removed one hour after death, fixed in formalin, and examined histologically at the Otological Research Unit, Queen Square.

PATHOLOGY

In Figure 3 is shown a low-power photomicrograph of a horizontal section of the affected temporal bone. The middle-ear cleft is filled with blood clot. The cochlea shows a distention of the endolymph system of a type characteristic of Ménière's disease. Posteriorly in the operation area the dura has been stripped from the posterior surface of the petrous bone. The posterior canal and the intrapetrous portion of the saccus are also shown. The saccus has been divided at the front where it passes from the bone backward into the dura by the separation of the dura onto the anterior lip of the fossette. This can be clearly seen. The section therefore shows that this critical step of the operation was successfully carried out.

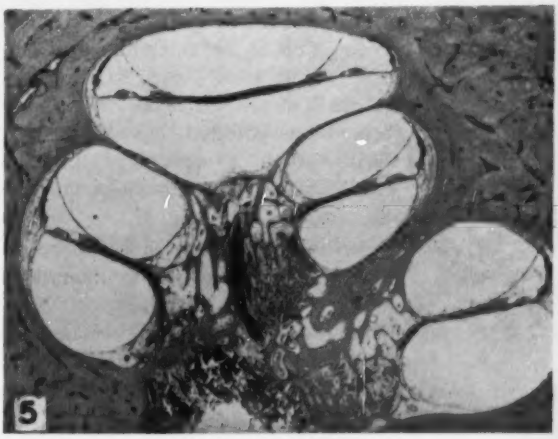
In Figure 4 is shown the cochlea at a higher magnification. As usual, the spiral ganglion and cochlear nerve fibers appear normal, and no obvious changes can be seen in Corti's organ.

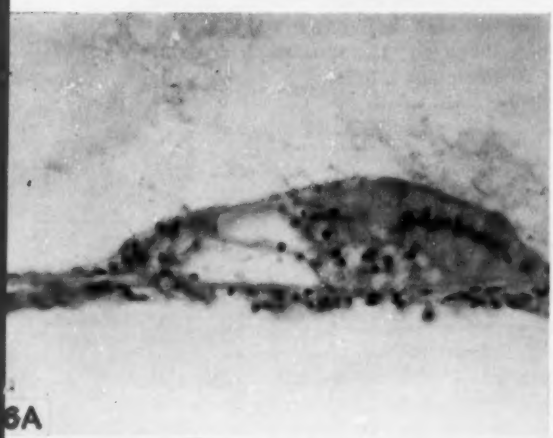
In Figure 5 is shown the cochlea of the unaffected side. It is completely normal.

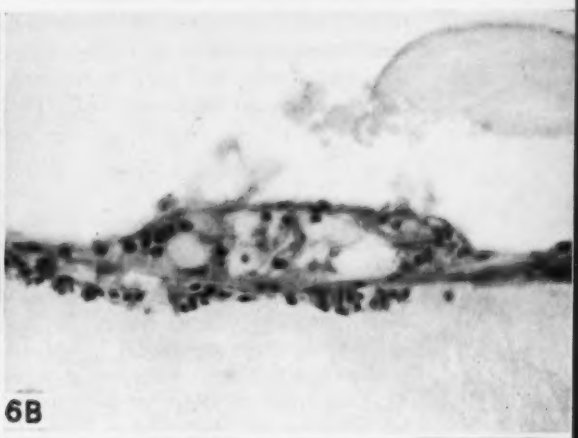
COMMENT

Two points of particular interest arise. They concern the histological condition of the hair cells of Corti's organ and the position of Reissner's membrane in the affected cochlea.

Corti's Organ.—There now seems to be an increasing measure of agreement that the hearing defect in Ménière's disease, with its peculiar characteristics including loudness recruitment, is attributable to pathological changes in Corti's organ. One of the difficulties here has been the fact that it has not been possible in any of the temporal bones which have so far been examined to demonstrate definite changes in the hair cells. In the present case, however, well-marked changes in these cells have been demonstrated. These are shown in Figure 6, which comprises a number of high-power photomicrographs of the organ of Corti, taken from the anterior







apical and the anterior middle turns of the two cochleae. The normal cochlea is shown on the left and the affected cochlea on the right. In spite of the fact that fixation is by formalin only, with a good deal of inevitable postmortem artefact, the difference between the two sides is not difficult to recognize. In the unaffected cochlea, the size and shape of the organ are normal, with fairly good preservation of the outer hair-cell complex. In the middle turn, in particular, the nuclei of the hair cells can be clearly seen. In the affected cochlea, however, Corti's organ is obviously shrunken, with disorganization of the outer hair-cell complex.

Position of Reissner's Membrane.—This point is of particular interest in view of the possible effects of Portmann's operation. Thus, if it be assumed that the effect of the operation is to reduce the endolymph tension by permitting an escape of endolymph from the divided saccus, there might be expected some tendency of Reissner's membrane to revert to its normal position. As shown in Figure 4, no such change seems to have occurred. The absence of any such tendency is noteworthy but cannot be taken to invalidate the theoretical basis of the operation. It is likely, for instance, that after a long-standing stretching of Reissner's membrane, growth of the membrane would occur and enable it to occupy its new position without tension.

In other words, the bulging of Reissner's membrane, so clearly seen in Figure 4, cannot be taken to mean a raised endolymph pressure at the time of the patient's death. It means only that in the past there was a raised pressure forcing the membrane into its new position.

Thus Portmann's operation, carried out in a case of established Ménière's disease, would not of necessity cause any change in the position of Reissner's membrane. Nevertheless, should any further outpouring of endolymph occur, then, instead of causing a further displacement of Reissner's membrane, it would be discharged through the open saccus with minimal pressure changes in the labyrinth, and, so, the purpose of Portmann's operation would be fulfilled.

GLOMUS JUGULARE TUMOR OF THE MIDDLE EAR

A Clinical Note

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THERE have been a sufficient number of reports in the literature on vascular tumors of the middle ear, many of which arise from the glomus jugulare,[1] that every otolaryngologist should be aware of their varied symptomatology and clinical appearances. Only by recognizing these lesions in an early stage can one effect a cure before the disease has had a chance to involve neighboring structures.

As the number of reports grows and many clinicians pool their experiences, a definite clinical pattern is appearing. The otolaryngologist is indebted to Brown [2] for his very succinct summary of the various symptoms and signs. While in the past most cases have been recognized in a late stage of the disease, when the hearing had been irrevocably destroyed or the facial nerve paralyzed, it should now be possible to anticipate these catastrophes by early recognition of the tumors.

Undoubtedly, Rosenwasser * has had the widest experience with glomus jugulare tumors; and, although he feels that most of the symptoms of these tumors are nonspecific, it would appear from the experiences of others that the over-all pattern is specific for at least highly vascular tumors of the middle ear, including glomus jugulare tumors.

REPORT OF A CASE

A 67-year-old white woman attended with the chief complaint of deafness and a loud, pulsatile swishing sound in the left ear for nine years.

Examination of the ears, nose, and throat revealed normal findings apart from the left ear. The external canal was normal. The tympanic membrane was intact, red, and bulged irregularly; the greatest convexity was located posteroinferiorly. Pulsation of the lesion was very obvious, even to the naked eye. Hearing tests revealed an approximate 35 db. conduction deafness.

Somewhat hastily it was decided that the condition was an inflammatory one and that a myringotomy was indicated. The tympanic membrane was incised, and the severity of the hemorrhage which ensued was distinctly embarassing to the patient and physician alike. Because of this unfortunate incident a tentative diagnosis of glomus jugulare tumor was entertained.

X-ray (Fig. 1) of the mastoids revealed marked clouding of the mastoid air cells on the left, which presented the characteristics of acute mastoiditis. There was no other evidence of bone destruction.

Operation was advised and performed. Through a postaural approach the mastoid cortex was exposed and removed. The air cells were found to be filled with clear serous fluid which pulsated

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* References 3 and 4.

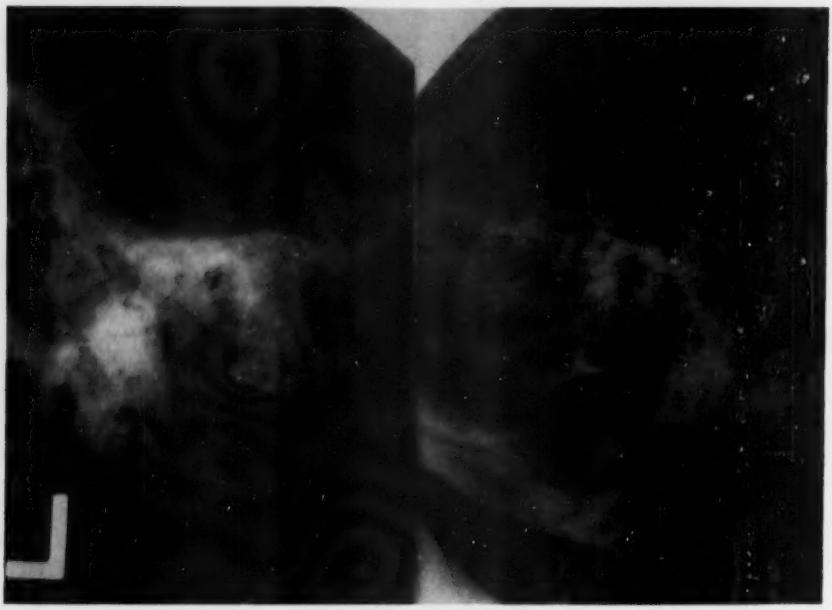

Fig. 1.—Lateral x-ray of the left mastoid shows clouding and demineralization of the cell partitions. This is in marked contrast to the normal architecture on the right.

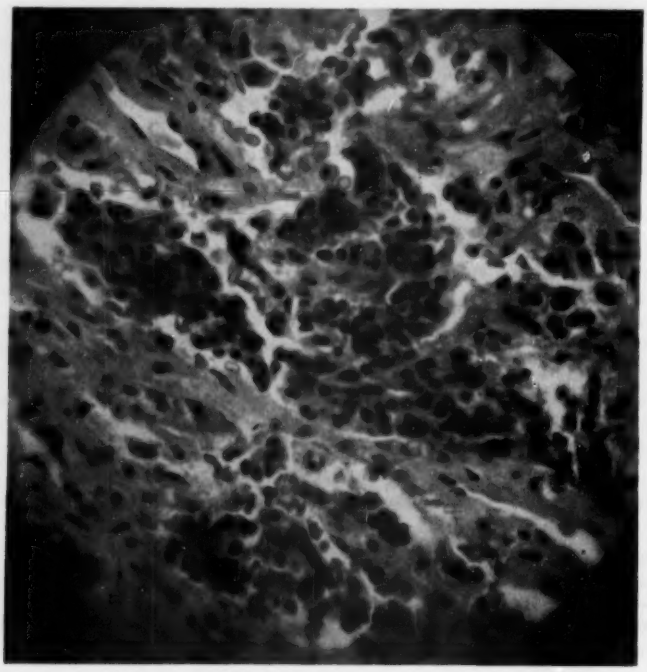

Fig. 2.—Solid clusters of endothelial-like cells and blood spaces; × 375.

vigorously. The cell partitions were soft and easily removed. On exposure of the mastoid antrum, it was found that its anterior two-thirds and the aditus were filled with a red, friable, pulsating tumor. The tumor bled on the slightest trauma. The mastoid bridge and the lateral wall of the epitympanum were removed so that the tumor and the tympanic membrane could be removed in toto. Bleeding was violent at this stage; when the middle ear had been cleared, the source of bleeding was seen to be an artery situated below the pyramidal process. The bony walls of the middle ear were intact. The cavity was packed and the postaural incision closed after the usual plastic repair of the external auditory meatus.

One week later the wound was reopened and a split-thickness skin graft was inserted into the mastoid cavity. The wound healed by primary intention.

The pathology (Fig. 2) was carefully investigated by Dr. Russell P. Sherwin, who noted the presence of an angiomatous structure exhibiting many solid clusters of endothelial-like cells and concluded that the tumor was an unusual cellular hemangioma, possibly a glomus jugulare tumor. Dr. Philip M. LeCompte was not certain that the lesion represented a glomus jugulare tumor and felt that it might be a hemangioma with artifactual cellular aggregates. Drs. S. Summers, T. Winship, Olive Gates, and Werner Mueller considered the diagnosis of glomus jugulare tumor appropriate.

COMMENT

Vascular tumors of the middle ear are undoubtedly unusual lesions, and for that reason no one otologist has had the opportunity to have wide experience with them. The collection and evaluation of the experience of many, however, make it possible to determine the clinical pattern of these lesions so that a case can be handled with a degree of acquired foreknowledge.

The case reported here conforms closely to Brown's [2] description of the clinical features of glomus jugulare tumors. Deafness had been present for a very long time, indicating that the tumor was probably slow growing. The tinnitus was of the kind that one would expect to find associated with any vascular tumor in the middle ear. Spontaneous pulsation was present; hence it was not necessary to use Brown's compression test.[2] The x-ray appearances must certainly be due to the generalized increase of vascularity in the region, leading to absorption of the osseous minerals and consequent radiolucence. Land [5] described the roentgenological findings in an advanced case in which there was extensive bone destruction brought about by actual invasion by the tumor. It is of interest that, although the mastoid process and the petrous pyramid were eroded, the labyrinthine capsule was still intact.

Lundgren's [6] experience with three cases in which the tympanic membrane was intact is unique. Although the membrane in the present case was still intact, it most probably would have ruptured in the near future. In the future, it is probable that more cases will be recognized in the presence of an intact drum membrane.

Although very few of these tumors have shown malignant tendencies, the need for prolonged and careful follow-up is of paramount importance.[7] In the event that the removal has been incomplete, recurrence is inevitable.

SUMMARY

A case of glomus jugulare tumor of the middle ear with an intact drum is described.

The clinical features are emphasized.

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CONVULSIVE STATE PRODUCED BY VARIOUS TYPES OF SHOCK

Conduct of Three Barriers (Blood-Aqueous, Blood-Labyrinthine Fluids, and Blood-Liquor [Spinal Fluid]) with Reference to Some Convulsive States

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RECENT experiments have proved that a convulsant dose of pentylenetetrazole (Metrazol; Cardiazol) can increase the permeability of the encephalon to procaine, whereas such increase is not to be noticed after electric shock.[1] We thought that it would be interesting to see whether a convulsive state artificially excited could alter the blood-encephalic barrier and, along with it, the other three great barriers, which supervise the interchange between blood and aqueous humor, blood and liquor (spinal fluid), and blood and labyrinthine fluids, respectively.

Ample studies have been made concerning each one of these barriers in order to determine, by means of well-characterized and easily measurable substances, the relationship between the structure of these substances or, better, their chemical and physical properties and their capacity for crossing the various barriers.[2] Likewise, we wanted to see which alterations, both in the universal and in the strictly regional conditions of the organism, could affect the permeability of the barriers to these substances.

As to the dyestuffs, we observed that the degree of permeability of the biological barriers could be easily recorded for those, such as fluorescein sodium, which are easily diffusible and measurable in small concentrations; they therefore are particularly suited to the purpose.

The authors who have treated this subject agree in regarding the vascular endothelium as the anatomic formation chiefly responsible for the phenomena concerning the biological barriers, though they admit that other formations may contribute to their functioning. In addition, undoubted importance must be attached to the pressure of the fluids in the capillary system. According to some authors, the extent of the capillary bed itself is conditioned by the relaxing of precapillary formations, which, under the influence of adenosine triphosphate (ATP), behave as a sphincter.

It is well known that the convulsive state is accompanied by an intense "vascular storm," with rapid alterations of the vascular caliber, especially in the cerebral region.

We believe that our research within the aforesaid limits should be of particular interest.

From the Otorhinolaryngologic Clinic, the Ophthalmic Clinic, and the Pharmacological Institute of the University of Milan.

METHOD AND MATERIALS

Fluorescein was used as the dyestuff for our experiments. We placed it in the biological fluids beyond the three mentioned barriers either under normal conditions or after acetylcholine, pentylenetetrazole, or electric shock.

For the acetylcholine shock we injected adult guinea pigs, of an average weight of 500 gm., with 8 mg. per kilogram of acetylcholine intravenously. Immediately before this, we had injected 100 mg. per kilogram of fluorescein in the vein of the paw. We thus brought about a convulsant effect which lasted about four minutes, displaying the characteristic symptomatic picture (bronchospasm, sialorrhea, etc.).[3]

We provoked the pentylenetetrazole shock by injecting the animal intravenously with a dose of 15 mg. per kilogram of pentylenetetrazole.

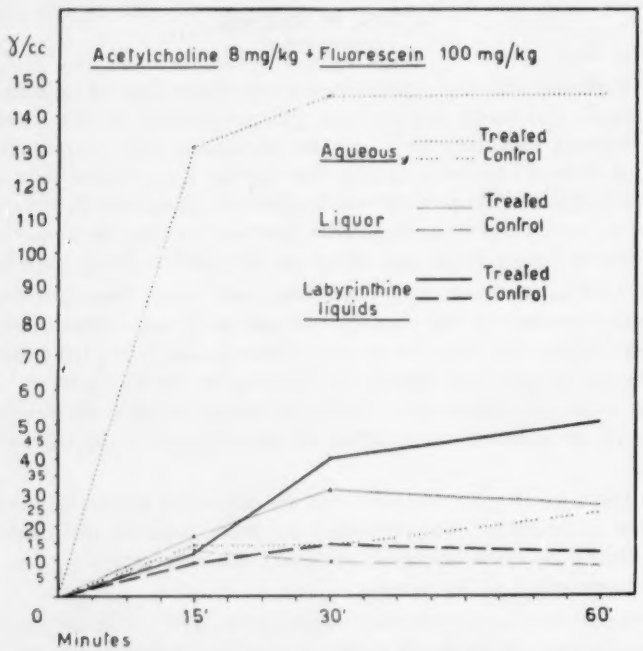

Chart 1.—The concentration of fluorescein in control animals and those in which an acetylcholine shock was produced. Each value is the average result of eight tests.

To provoke the electric shock we applied two electrodes, furnished with pincers and imbued in a hypersaturated solution of NaCl, to either base of the animal's auricular pavilions. The current intensity was 150 ma.; the voltage, 120 volts, and the time, three seconds.

As to the technique employed to remove the fluids, it will suffice to say that, after bleeding the animals to death, we collected the blood in test tubes and submitted it to centrifugation. The spinal fluid was drawn into a glass capillary tube by piercing the occipital-atloid membrane, which had been previously laid bare; the aqueous humor was removed by cornea puncture. We used the technique of Ventura Gregorini [4] to take away the labyrinthine fluids; that is, after isolating the auditory bulla, we removed its side wall to expose the cochlea to view. Then with the aid of a microscope for dissection we made a hole in correspondence with the basal ring of the cochlea. Through the hole we introduced a glass capillary tube, in which rose the labyrinthine fluid. Then we deposited a drop of each of the extracted liquids on strips of bibulous

paper and compared the intensity of the fluorescent dye under a Wood light. Such a comparative examination was carried on in accordance with a scale of dilution at the known titration of the dyestuff.

In the case of acetylcholine shock, wherein we registered the greatest differences, we recorded the results of the collection of samples from different animals after 15, 30, and 60 minutes.

For the pentylenetetrazole shock we recorded the results obtained after 15 minutes, whereas for the electric shock the results were recorded after 60 minutes, since we think that, for an analogy with the other convulsants, if it had been possible to exhibit any difference whatever this would have shown more clearly after a longer interval.

All results are synthesized in Charts 1 and 2.

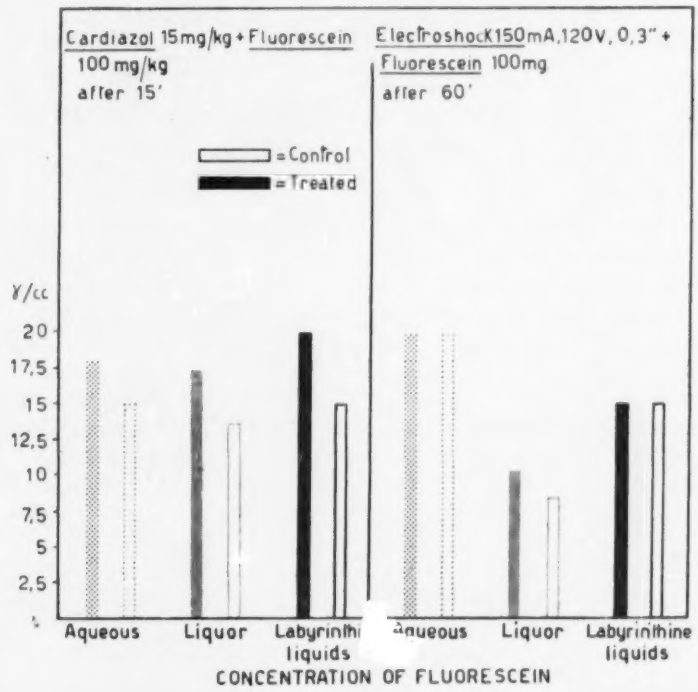

Chart 2.—The concentration of fluorescein in control animals and those in which pentylenetetrazole (Cardiazol) and electric shocks were produced. Each value is the average result of eight tests.

RESULTS

The results can be summarized as follows: A convulsant dose of acetylcholine exerts a very important influence on the permeability of the various barriers. The blood-aqueous barrier, the most permeable in itself, allows in animals treated with acetylcholine a very remarkable increase in the rate of passage of the dyestuff. Likewise, the other two barriers display a decidedly greater permeability. An hour after the administration of acetylcholine, the concentration of fluorescein in the aqueous humor (about 145 γ/cc.) exceeds that of the blood serum (about 100 γ/cc.). The concentration of fluorescein in the aqueous humor after an hour is about six times

greater in the animals treated with acetylcholine than in the controls. Notable differences are to be found also in the labyrinthine fluids, in which the concentration of fluorescein, an hour after the acetylcholine shock, is more than three times greater in the experimental animals than in the controls. Due consideration must also be given to the fact that, in the long run, the increase in permeability under the influence of the acetylcholine shock is more conspicuous for the labyrinthine fluids than for the liquor (spinal fluid).

Also, in the case of pentylenetetrazole shock the concentration of fluorescein registered in the aqueous humor, in the liquor (spinal fluid), and in the labyrinthine fluids is greater in experimental animals than in the controls.

Electric shock does not seem to affect the permeability of the three barriers in any notable degree.

CONCLUSIONS

The results of our experiments seem to deserve further comment for more than one reason.

In the first place, one might object that the convulsive state is not in itself such to make the barriers of the cephalic region permeable, since the electric shock does not affect these barriers. On the other hand, the remarkable results we get by using pentylenetetrazole become even more pronounced if acetylcholine is employed.

It is known from the literature on the subject, and also from recent experiments,* that also the electric shock brings about a certain "vascular storm," wherein an initial fall in the arterial pressure is followed by a rise. But still the pressure upset is more remarkable in the pentylenetetrazole shock, which causes a more lasting rise. We think that Villaret's [5] and Raverdino's † experiments on acetylcholine are worth mentioning, because of the emphasized increase in the permeability of the blood-aqueous barrier. With experimental animals under the influence of small doses of acetylcholine, Villaret and Raverdino registered a distinct and ready dilatation of the central artery of the retina after a fleeting phase of constriction.

Therefore, the alterations in the permeability of the above-considered biological barriers seem to vary with the intensity of the circulatory alterations following the shock rather than with the convulsive state itself and the chemical and humoral changes it may cause. Acetylcholine may play a special part in the relaxing of those precapillary sphincters we mentioned before.

Our results seem also to confirm the fundamental analogy existing in the conduct of the three barriers, inasmuch as the recorded alterations can be equally ascribed to each one of them.

On the other hand, our experiments stress once more the particular significance to be attributed to the various kinds of shock from the physiologic as well as from the pathologic and therapeutic point of view.

The intense alteration in the permeability of the three barriers, as illustrated by our experiments with the acetylcholine shock, seems to deserve further analysis, as it may also be suggestive of the alterations of the metabolic interchange occurring between blood and tissues under this kind of shock.

* Della Bella, D.: Personal communication to the authors.

† Reverdino, cited by Fiamberti.[3]

SUMMARY

We have studied the conduct of the three barriers—blood-aqueous, blood-liquor (spinal fluid), and blood-labyrinthine fluids—in animals submitted to acetylcholine, pentylenetetrazole (Cardiazol), and electric shock, with reference to the passage of fluorescein.

It has been found that the acetylcholine shock increases to a very high degree the permeability of the blood-aqueous barrier; also the other barriers are made more permeable. The pentylenetetrazole shock is also effective in this direction, though in a lesser degree, whereas the electric shock is almost ineffective. As a general rule, the three barriers display a similar conduct, at least in the qualitative sense. The permeability to the labyrinthine fluids is sometimes greater than to the liquor (spinal fluid). We emphasize the importance of the various effects caused by the different types of shock in order to point out the individual characteristics attributed to each kind of shock from the therapeutic point of view.

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IMPORTANCE OF ENDOSCOPY IN PARALYSIS OF THE VOCAL CORDS

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THE IDEA for this paper occurred after several experiences in which cases of unilateral paralysis of the vocal cord, and especially the left vocal cord, were presented to me for diagnosis. There seemed to be some bewilderment and then dismay when I asked if an x-ray of the chest had been taken or if the chest had been examined. With the hope of reminding otolaryngologists of the peculiar anatomy of the recurrent laryngeal nerve, the importance of endoscopy in laryngeal paralysis is reviewed.

Paralysis of the vocal cord is usually of extralaryngeal origin, and, as has been stated many times, the etiology is frequently determined by the general examination by the internist. However, as laryngologists, we are requested to explain the reason for hoarseness, and, when on laryngoscopy we find a vocal cord paralysis, we are asked to account for the difficulty. This, of course, means that we must have some knowledge of the anatomy and pathogenesis of laryngeal paralysis. Then, too, as otolaryngologists, in addition to making the diagnosis of paralysis of the vocal cord by laryngoscopy, we are asked to contribute further information by performing a bronchoscopy or esophagoscopy.

It seems superfluous to review the anatomy before an audience such as this. Suffice it to remind you of the difference in the recurrent laryngeal nerves. The right arises from the vagus nerve in front of the right subclavian artery, passes backward around the vessel, and ascends along the trachea to the larynx. The left recurrent nerve arises in front of the arch of the aorta, winds backward around the aorta, and ascends along the side of the trachea. It is readily understandable that, since the left recurrent laryngeal nerve has a longer course, it is more likely to be involved in conditions causing pressure or any extension of disease in adjacent organs. This disturbance may be in the thoracic cage, and so a study of the lungs and the contents of the mediastinum is imperative. We must bear in mind the relationship of the esophagus to the trachea, the approximation of the pleura and the lungs to the mediastinum, the presence of lymph nodes in the mediastinum and around the hilums of the lungs, and the relationship of the nerve to the heart, pericardium, and great vessels in the mediastinum.

Recent investigation into the anatomy of the recurrent laryngeal nerves has revealed the importance of the frequent extralaryngeal division of the nerve into two branches. The anterior division supplies the adductor muscles; the posterior division, the abductor muscles. If, then, a cord is found in abduction, one would

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Presented at the Fourth Pan-American Congress of Oto-Rhino-Laryngology and Broncho-Esophagology, México, D. F., Mexico, March 1, 1954.

conclude that the injury was to the anterior branch and took place near the larynx or in the thyroid area. If the cord is in the midline, the injury would involve the posterior branch and, again, would be found in some proximity to the larynx. But if the cord is in an intermediate position, the entire recurrent nerve is involved. In other words, a lesion affecting the entire recurrent laryngeal nerve involves both adductors and abductors of the larynx, and the cord is in an intermediate, or paramedian, position and bowed. Since the superior laryngeal nerve is not involved, the cricothyroid muscle remains active and consequently the vocal cord does not lose its ability to tense on phonation. With complete loss of tension, as well as abduction and adduction, the cord would be truly cadaveric in appearance and the paralysis more central in origin.

A central lesion is usually accompanied by indications of paralysis of other cranial nerves and may be excluded. A peripheral lesion may be caused by pressure of disease in areas adjacent to the larynx, as in carcinoma of the thyroid, enlarged cervical nodes due to Hodgkin's disease, leukemia, etc., but it is the lesion within the chest that interests us in this discussion.

Pressure on a recurrent laryngeal nerve within the thorax would involve the entire nerve, and, therefore, the cord would be in an intermediate, or paramedian, position, with some relaxation. It follows then that whenever we encounter such a paralysis and there is no pathology in the adjacent areas of the neck, and no history of injury, as in thyroidectomy, we must look for difficulty within the chest.

A careful history and a meticulous physical examination should be done to unfold any symptoms and signs referable to the lungs, mediastinum, heart, or circulatory system. Then, an x-ray of the chest is important to further localize the difficulty. Frequently additional evidence is required to attain a diagnosis, and here a bronchoscopy or an esophagoscopy may reveal the etiology.

Cardiac studies, including x-ray, may show conclusively diseases of the heart or the large blood vessels that may press on the recurrent laryngeal nerve. However, frequently there is some doubt as to the etiology, and bronchoscopy may reveal pressure on the trachea or bronchus or a broadened mediastinum that is presumptive evidence of the presence of pathology. Then, too, if the area is pulsating, one knows that he is dealing with a circulatory disease. A diagnosis of aneurysm is sometimes considered a contraindication to bronchoscopy, but there are times when its existence is not a certainty and bronchoscopy is required. The bronchoscopy should be done with great care, and certainly if an erosion is seen, a biopsy specimen should by no means be taken. This is one of the many reasons why a case should be thoroughly worked up by an internist before endoscopy is undertaken.

A mediastinal enlargement and a hilar or apical shadow of the lung in an x-ray may indicate the presence of pathology but may not be conclusive. Bronchoscopy may reveal the existence of a tumor either by direct vision or by the appearance or encroachment on the lumen and rigidity of the bronchus on the involved side. One is able to note the broadening of the mediastinum. A biopsy specimen of a tumor may be taken, and aspirated specimens may be examined for cells. It is true that the greatest percentage, if not all, of carcinomas that cause paralysis of the vocal cord prove to be inoperable, but at least a diagnosis of the cause of the paralysis can be made. This is important because not all masses in the chest are cancerous. They may be lymphomas of a type that is

sensitive to radiation therapy and can be so treated. Besides, enlargement of the nodes and shadows around the hilar area may be tuberculous in origin, and, if this can be determined, proper treatment may be administered. Extensive adhesions and scarring near the apices of the lungs—healed areas of tuberculosis —may involve the recurrent nerves so as to cause paralysis. Pressure on the trachea and adjacent recurrent nerve may be due to a substernal thyroid.

Carcinoma of the esophagus may also enlarge to involve the laryngeal nerves and must be considered. Certainly a history of difficulty in swallowing would lead one to examine the esophagus, but occasionally there is no revealing history until late in the disease, and it is best to include an esophageal x-ray study and an esophagoscopy in the investigation of paralysis of the vocal cord.

As stated above, the left vocal cord is more frequently involved than the right, because of the greater length of its course. Some of the conditions encountered include myocardial disease, mitral valvular disease, dilated left ventricle, or enlarged left auricle. The enlargement of the ventricle or auricle may cause pressure at the root of the left lung and against the arch of the aorta, involving the recurrent nerve. Enlargement of the pulmonary arteries may act similarly. An adhesive pericarditis or a pericarditis with effusion may also affect the laryngeal nerve. Aortic aneurysm is a very frequent causative factor in paralysis of the left vocal cord.

Diseases of the lung and mediastinum that may cause left recurrent laryngeal nerve paralysis include carcinoma or sarcoma of the lung (especially at its root or in the spical areas), thickened pleura at the upper and medial portions of the lung, and tuberculosis in the form of a tuberculoma, extreme scarring of the apex of the lung, or enlarged and calcified mediastinal nodes near the trachea and the hilar areas. Primary mediastinal tumors, secondary metastatic mediastinal lymphadenopathy from lesions in adjacent organs and from distant organs, as the breast, pelvis, and rectum, and substernal thyroid enlargement may also affect the recurrent nerve.

In the esophagus the most frequent disease is carcinoma. Extreme dilatation of the esophagus secondary to achalasia has also been reported.

In paralysis of the right vocal cord one must look to apical pathology, such as carcinoma, tuberculoma, and tuberculous scarring, as well as aneurysm of the innominate or subclavian artery. Aneurysm of the aorta large enough to involve both laryngeal nerves has also been reported. Carcinoma of the upper portion of the esophagus frequently affects the right laryngeal nerve. I can recall at least two cases of paralysis of the right vocal cord in which determination of the diagnosis of carcinoma of the esophagus was delayed because its possibility was not considered and investigated.

I want to stress the fact that even though an x-ray is negative, one should carry out investigation of a vocal cord paralysis by performing a bronchoscopy and an esophagoscopy. A bronchoscopy is especially important in left vocal cord paralysis, and esophagoscopy is necessary in right vocal cord paralysis, but both should be done in any work-up.

In conclusion, I wish to emphasize that we as otolaryngologists must be aware of the many etiological factors in paralysis of the vocal cords. We must always be mindful of the possibility of a lesion within the chest pressing on or involving the recurrent laryngeal nerves. Bronchoscopy and esophagoscopy are

necessary examinations in determining the cause of laryngeal paralysis and should be performed not only to demonstrate pathology revealed on x-ray examination but to attempt to disclose a lesion that is not otherwise discovered.

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CHRONIC SUPPURATIVE OTITIS MEDIA

Study of Sensitivity to Antibiotics of Bacteria Commonly Found in Chronic Otitis Media

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THIS STUDY was primarily undertaken to determine the kinds of flora which are prevalent in the middle ear of patients suffering from chronic suppurative otitis media and also to study the sensitivity of organisms thus isolated to the antibiotics, as there is a paucity of literature on this subject. Numerous articles have been published on the flora of acute suppurative otitis media, but very few exist on the common organisms responsible for chronic suppurative otitis media. The rapid disappearance of acute suppurative otitis media from the clinics with the advent of antibiotics and the frequent presence of chronic suppurative otitis media and its poor response to the routine treatment are the factors which are responsible for the above undertaking.

It is realized that there are anatomical factors responsible for chronicity, but it was considered essential to find out if the various organisms isolated from the discharge of chronic suppurative otitis media had any role to play in the prolonged and unsatisfactory course of treatment of this disease, so common in children. The children with chronic suppurative otitis media are usually robbed of effective hearing, with the result that they cannot pursue their studies as well as their healthy classmates. This handicap reduces their utility to the State and thus results in a great national loss. It is a pity to note that those patients in whom chronic suppurative otitis media develop suffer at least partial deafness. The only safe course therefore is the prevention of acute suppurative otitis media, which is so easily preventable, provided intensive propaganda is carried out to insure the care of the ear, nose, and throat in infants. Once the disease has developed, we can nip it in the bud if these young patients are brought to us when the disease is in an early stage and is so easily amenable to treatment with the various antibiotics. But India is a vast country with far-flung villages, very poor communications, and an abnormally low state of literacy. The result is that the children are brought to us late, i. e., when the chronic suppurative otitis media has established itself in various crevices of the middle ear and is hardly vulnerable to treatment. We realize that

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Read before the All India Otolaryngologists' Conference, Patna, Dec. 23, 1952.

to cope with this state of affairs some treatment better than the routine was essential to prevent recrudescences and relapses, which were too frequent and ultimately placed the patient in a state of chronic ill health.

METHODS OF STUDY

Ear discharge was cultured from 183 ears of 150 patients, 33 cases being bilateral. In every case detailed clinical examination was carried out. The discharge was taken directly from the middle ear by a flamed platinum loop under direct vision and cultured on blood agar. Because of the large preponderance of Proteus vulgaris, surface contamination was suspected, and it was thought that P. vulgaris might be stifling the growth of the other organisms. To exclude both these factors, 25 specimens were also cultured on chloral hydrate medium, 1:100, in addition to blood agar, as chloral hydrate inhibits the growth of P. vulgaris and allows other organisms to assert themselves.

To find out whether the nasopharynx acted as a source of infection in chronic suppurative otitis media, nasopharyngeal flora were also studied in 25 cases of chronic suppurative otitis media. The material was collected with West's bent tube introduced through the mouth.

In 28 dry ears with dry perforations of more than 15 days' duration, bacterial flora of the external auditory meatus were studied to determine whether the recurrences in chronic suppurative otitis media were due to fresh infection or whether the organisms were lingering in the external auditory meatus.

TABLE 1.—*Dilution of Drugs Used in Testing the Sensitivity of Bacteria*

Test Tube No.	Oxytetracycline, γ/Cc.	Chloramphenicol, γ/Cc.	Chlortetracycline, γ/Cc.	Dihydrostreptomycin, γ/Cc.	Penicillin, γ/Cc.	Sulfadiazine, Mg./Cc.
1	100	100	100	100	12	10
2	50	50	50	50	6	5
3	25	25	25	25	3	2.5
4	12.5	12.5	12.5	12.5	1.5	1.25
5	6.3	6.3	6.3	6.3	0.75	0.62
6	3.1	3.1	3.1	3.1	0.37	0.31
7	1.6	1.6	1.6	1.6	0.18	0.15
8	0.8	0.8	0.8	0.8	0.09	0.08
9	0.4	0.4	0.4	0.4	0.04	0.04
10	0.2	0.2	0.2	0.2	0.02	0.02

Bacterial flora of the external ear were studied in 25 normal cases to determine whether the organisms responsible for chronic ear discharge were already lurking in the external ear or whether they came from some external source.

In the first 50 organisms isolated, sensitivity tests were carried out with sulfadiazine, penicillin, dihydrostreptomycin, oxytetracycline (Terramycin), and chlortetracycline (Aureomycin). Later chlortetracycline was omitted, as it did not produce satisfactory results in in vitro experiments, and it was replaced by chloramphenicol (Chloromycetin) in the next 50 organisms. A review of the literature shows that chlortetracycline does not give satisfactory results in in vitro tests due to its destruction during incubation.

Technique Adopted for Sensitivity Tests (Dilution Method).—Ten test tubes were set out in a test-tube rack for each drug. Into each one of the test tubes, except the first, was delivered 0.5 cc. of sterile infusion broth (pH 7.3 to 7.4). To the first and second tubes 0.5 cc. of the drug was added. Each 0.5 cc. of sulfadiazine contained 10 mg.; 0.5 cc. of penicillin contained 12 γ, and each 0.5 cc. of dihydrostreptomycin, chloramphenicol, chlortetracycline, and oxytetracycline contained 100 γ. These were taken from stock solutions already prepared, except for chlortetracycline, which was freshly prepared each time it was required. The stock solutions remained fresh for 15 days in a refrigerator. Contents of the second tube were mixed and 0.5 cc. of the contents was transferred to the third. This procedure was repeated for the third, fourth, and succeeding tubes, and 0.5 cc. from the last tube was discharged, so that all tubes in the series had 0.5 cc. containing original standard solutions of 1:1, 1:2, 1:4, etc. To each of

these tubes 0.5 cc. of a 24-hour culture in broth, 1:10,000 dilution, was added. The final concentration of culture was 1:20,000, while that of the drug is shown in Table 1. The test-tube rack was gently shaken and placed for 24 hours in an incubator at 37 C. and watched for turbidity the next day. The first clear tube was an indication of the minimum inhibitory concentration.

RESULTS

Results of Cultures

No growth was obtained from four ears, while the following organisms were isolated from the rest of the cases:

1. *Proteus Vulgaris.*—It was isolated from 83 ears. Pure growth was obtained in 64, and the following organisms were grown in association with this organism in the remaining cases:

Paracolon bacilli	1
Bacillus pyocyaneus	1
Bacillus lactis aerogenes	1
Viridans type of Streptococcus	1
Staphylococcus albus	1
Corynebacterium xerose	14

This reveals that P. vulgaris was associated with 4 pathogenic and 15 nonpathogenic organisms.

2. *Bacillus Pyocyaneus.*—This organism was isolated in 36 cultures, and pure growth was obtained in 26. The following organisms (more than one in two cases) were cultured in association with it:

P. vulgaris	1
B. lactis aerogenes	1
Staph. aureus	2
Paracolon bacilli	1
Viridans type of Streptococcus	1
Staph. albus	3
C. xerose	3

3. *Staphylococcus Aureus.*—This organism was isolated in 22 cultures, out of which pure growth was obtained in 11, while in the rest it was associated with the following organisms (more than one in one case):

B. pyocyaneus	2
Paracolon bacilli	1
Viridans type of Streptococcus	1
Staph. albus	5
C. xerose	3

4. *Staphylococcus Albus.*—It was isolated from 14 ears. Pure growth was obtained in three, out of which one was coagulase-positive. The rest were associated with the following pathogenic organisms:

P. vulgaris	1
B. pyocyaneus	3
B. lactis aerogenes	2
Staph. aureus	5

5. *Bacillus Lactis Aerogenes.*—This organism was isolated in 12 cultures, in 6 of which it was associated with the following organisms:

Paracolon bacilli	1
P. vulgaris	1
B. pyocyaneus	1
Staph. albus	2
C. xerose	1

6. *Paracolon Bacilli.*—This organism was isolated from nine cultures. Pure growth was obtained in four, while the following bacteria also were cultured in the others:

P. vulgaris	1
B. pyocyaneus	1
B. lactis aerogenes	1
Staph. aureus	1
C. xerose	1

7. *Bacillus Coli Communior.*—Pure growth was obtained from three ears.

8. *Bacillus Coli Communis.*—Pure growth was obtained in two cases, while in a third it was associated with C. xerose.

9. *Viridans Type of Streptococcus.*—It was isolated in three cases. All of them were associated with one organism or another. The organisms grown in association with it were the following:

B. pyocyaneus	1
P. vulgaris	1
Staph. aureus	1
C. xerose	1

10. *Hemolytic Streptococcus.*—This organism was grown in two cultures, and in both of them it was associated with Staph. aureus.

11. *Streptococcus Lactis.*—Pure growth was obtained from two ears.

12. *Hemophilus.*—This organism was grown singly in both ears of one case, but the species could not be identified.

13. *Corynebacterium Xerose.*—This organism was isolated in 20 cultures. In none was it found in pure form. The following pathogenic organisms were cultured in association with it:

P. vulgaris	14
B. pyocyaneus	2
B. lactis aerogenes	1
B. coli communis	1
Paracolon bacilli	1
Viridans type of Streptococcus	1

14. *Bacillus Subtilis.*—It was grown from four ears (contaminative).

It is strange that in only one ear were there more than two pathogenic organisms. This fact alone proves beyond doubt that surface contamination was rare, if any existed. In this case, P. vulgaris was found in association with B. pyocyaneus and viridans type of Streptococcus.

In two bilateral cases different organisms were isolated from two ears. In one case (Case 60) B. pyocyaneus was cultured from the right ear and P. vulgaris from the left. In another case (Case 63) P. vulgaris and paracolon bacilli were grown from the right ear and P. vulgaris with B. lactis aerogenes from the other.

Chloral hydrate medium did not inhibit the growth of P. vulgaris or produce any change in the flora. This medium, however, inhibited two cultures of B. lactis aerogenes and one of B. pyocyaneus.

Out of 28 ears with dry perforation, no growth was obtained in 2. Pathogenic organisms were cultured from 14 ears, and the rest revealed coagulase-negative Staph. albus or C. xerose. The following pathogenic organisms were isolated:

P. vulgaris	4
B. pyocyaneus	1
Staphy. aureus	5
B. lactis aerogenes	1
Viridans type of Streptococcus	1

Only in one ear were two pathogenic organisms found together. These were Staph. aureus and B. pyocyaneus, and this patient had a dry ear for two months.

The following organisms were isolated from the external auditory meatus of 25 normal persons:

Staph.	17
C. xerose	10
Micrococcus	2
Micrococcus tetragenus	1

Negative growth was obtained in three ears. It is an indication that there are no pathogenic organisms in the external ear and that the organisms responsible for chronic ear discharge are introduced from outside.

Nasopharyngeal cultures revealed the following organisms:

Viridans type of Streptococcus	16
Neisseria catarrhalis	6
Staph. aureus	3
Diplococcus pneumoniae	2
Hemolytic streptococci	1
B. lactis aerogenes	1
Hemophilus (unidentified)	1
Gram-negative bacilli (unidentified)	1
C. xerose	11
Staph. albus	6

P. vulgaris and B. pyocyaneus, which are so common in chronic suppurative otitis media, were not isolated from the nasopharynx.

Discharge from the postoperative wound of mastoidectomy was cultured in one case, and P. vulgaris was isolated.

Results of Sensitivity Tests

A. Proteus Vulgaris.—Tests were carried out with 52 strains, and the results are given in Table 2 and Chart 1. For comparison, the curves are plotted in Chart 1 by using the percentage of the strains inhibited completely as the ordinate and the minimum inhibitory concentration as the abscissa. The following results are revealed:

TABLE 2.—*Results of in Vitro Tests for Sensitivity of Fifty-Two Pathogenic Strains of Proteus Vulgaris*

Strain of P. Vulgaris, No.	Concentration Necessary for Total Inhibition, γ/Cc.*					
	Sulfadiazine	Penicillin	Dihydrostreptomycin	Chlortetracycline (A) or Chloramphenicol (C)		Oxytetracycline
1	R †	3	1.6	A	R	R
2	R	3	6.3	A	R	R
3	R	6	1.6	A	R	50
4	10	6	3.1	A	R	25
5	R	3	1.6	A	R	100
6	R	6	3.1	A	R	R
7	R	6	1.6	A	R	R
8	0.08	R	12.5	A	R	12.5
9	R	3	12.5	A	R	100
10	10	R	50	A	R	R
11	10	R	6.3	A	100	R
12	R	R	25	A	R	R
13	10	6	3.1	A	R	R
14	10	6	1.6	A	R	R
15	10	R	50	A	R	R
16	10	R	50	A	R	R
17	R	6	1.6	A	50	6.3
18	R	12	12.5	A	R	R
19	R	12	6.3	A	R	R
20	2.5	12	50	A	50	6.3
21	5	6	6.3	A	R	R
22	R	R	25	A	R	R
23	R	R	100	A	R	R
24	R	R	100	A	R	R
25	R	12	3.1	A	100	12.5
26	R	R	12.5	A	12.5	100
27	R	12	1.6	C	50	R
28	R	12	3.1	C	6.3	R
29	R	R	0.8	C	3.1	25
30	10	R	25	C	100	R
31	10	R	25	C	100	R
32	R	R	100	C	6.3	6.3
33	R	R	25	C	100	100
34	R	12	12.5	C	50	100
35	2.5	R	6.3	C	50	100
36	1.25	R	6.3	C	100	R
37	10	R	3.1	C	50	12.5
38	10	R	1.6	C	12.5	6.3
39	R	12	6.3	C	12.5	50
40	R	12	6.3	C	12.5	50
41	R	3	0.4	C	6.3	0.8
42	R	12	0.8	C	25	6.3
43	R	R	12.5	C	R	100
44	10	12	6.3	C	12.5	R
45	R	12	12.5	C	12.5	R
46	R	6	6.3	C	25	R
47	R	6	6.3	C	50	R
48	R	6	6.3	C	100	R
49	R	6	6.3	C	50	R
50	1.25	6	3.1	C	50	R
51	2.5	6	6.3	C	50	R
52	R	6	6.3	C	50	R

* Concentration of sulfadiazine is expressed in milligrams per cubic centimeter.
† R, strain was resistant to concentration used.

1. In a concentration of 12.5 γ per cc., dihydrostreptomycin completely inhibited 77% of the strains; penicillin, 61.5%; chloramphenicol, 34.5%; oxytetracycline, 17.3%; and chlortetracycline inhibited only 3.8%.

2. In a concentration of 1.25 mg. per cc., sulfadiazine inhibited 5.7% of the strains.

3. In concentrations used in these tests, 81% of the strains were resistant to chlortetracycline; 63.5% to sulfadiazine; 59.6% to oxytetracyline; 38.5% to penicillin, and 4% to chloramphenicol, while all were sensitive to dihydrostreptomycin. From these results these drugs can be readily arranged in order of their

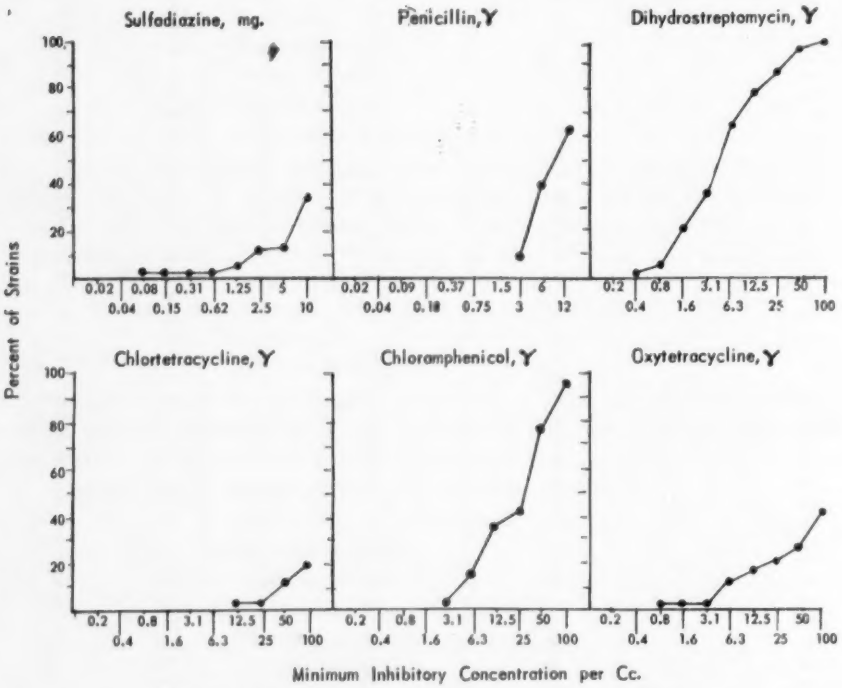

Chart 1.—Results of studies of sensitivity of Proteus vulgaris.

activity against our strains of P. vulgaris as follows: (1) dihydrostreptomycin, (2) chloramphenicol, (3) penicillin.

B. Bacillus Pyocyaneus.—Sensitivity tests were carried out with 16 strains, and their detailed results are given in Table 3 and Chart 2. For the sake of convenience the results can be summarized as follows:

1. In concentration of 12.5 γ per cc., 87.5% of the strains were totally inhibited by dihydrostreptomycin, 25% by oxytetracycline, and none by chloramphenicol.

2. In concentration of 1.25 mg. per cc., 75% of the strains were sensitive to sulfadiazine. This drug was found to be quite effective, but as other antibiotics were used in micrograms and this drug in milligrams, the results cannot be easily compared.

TABLE 3.—*Results of in Vitro Tests for Sensitivity of Sixteen Pathogenic Strains of Bacillus Pyocyaneus*

Strain of B. Pyocyaneus, No.	Concentration Necessary for Total Inhibition, γ/Cc.*					
	Sulfadiazine	Penicillin	Dihydrostreptomycin	Chlortetracycline (A) or Chloramphenicol (C)		Oxytetracycline
1	0.15	R †	3.1	A	R	50
2	0.15	R	3.1	A	R	50
3	R	R	6.3	A	R	12.5
4	0.08	R	3.1	A	R	100
5	0.04	R	6.3	A	R	6.3
6	0.02	R	6.3	A	R	6.3
7	0.08	R	0.8	A	100	12.5
8	0.08	R	6.3	C	100	R
9	0.08	R	6.3	C	100	R
10	1.25	R	6.3	C	50	100
11	0.31	R	6.3	C	100	50
12	R	R	12.5	C	R	100
13	10	R	12.5	C	100	R
14	0.31	R	3.1	C	100	R
15	0.31	R	50	C	100	50
16	10	R	50	A	R	R

* Concentration of sulfadiazine is expressed in milligrams per cubic centimeter.
† R, strain was resistant to concentration used.

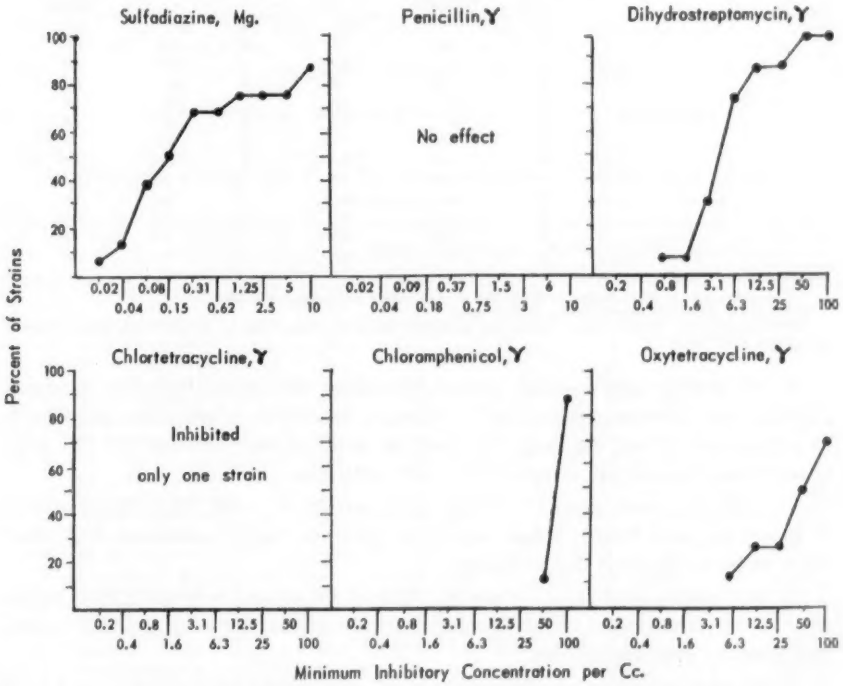

Chart 2.—Results of studies of sensitivity of Bacillus pyocyaneus.

3. In the concentrations used in these tests, 31.3% of the strains were resistant to oxytetracycline, 12.5% to sulfadiazine, and 12.5% to chloramphenicol. No strain was resistant to dihydrostreptomycin. All strains were resistant to penicillin, and all but one were insensitive to chlortetracycline. On the basis of these results the drugs can be arranged in order of merit as follows: (1) dihydrostreptomycin, (2) chloramphenicol, (3) oxytetracycline.

C. Staphylococcus Aureus.—Sensitivity tests were carried out with 13 strains, and their detailed results are given in Table 4 and Chart 3. In brief, these are the results:

1. In concentration of 6.3 γ, 100% of the strains were sensitive to oxytetracycline, 77% to penicillin, 61.5% to dihydrostreptomycin, 50% to chloramphenicol, and 14% to chlortetracycline.

2. Sulfadiazine was effective in 15.4% of the strains which were inhibited by 10 mg. per cc.

TABLE 4.—*Results of in Vitro Tests for Sensitivity of Thirteen Strains of Staphylococcus Pyogenes*

Strain of Staph. Pyogenes, No.	Concentration Necessary for Total Inhibition, γ/Cc.*					
	Sulfadiazine	Penicillin	Dihydrostreptomycin	Chlortetracycline (A) or Chloramphenicol (C)		Oxytetracycline
1	R †	0.04	0.2	A	100	3.1
2	R	0.02	0.2	A	100	3.1
3	R	R	25	A	100	6.3
4	R	0.02	0.8	A	100	3.1
5	R	12	1.6	A	50	1.6
6	R	12	1.6	A	12.5	1.6
7	R	0.04	0.4	A	6.3	1.6
8	R	0.09	0.2	C	6.3	1.6
9	10	0.04	6.3	C	6.3	0.8
10	10	6	25	C	12.5	1.6
11	R	0.04	12.5	C	12.5	0.8
12	R	0.18	12.5	C	6.3	1.6
13 ‡	R	6	12.5	C	12.5	3.1

* Concentration of sulfadiazine is expressed in milligrams per cubic centimeter.
† R, strain was resistant to concentration used.
‡ This strain was Staph. albus (coagulase positive), while the remaining 12 strains were Staph. aureus (coagulase positive).

3. All strains were sensitive to oxytetracycline, dihydrostreptomycin, chloramphenicol, and chlortetracycline, but 7.7% were insensitive to penicillin and 84.6% to sulfadiazine. Thus, the drugs of choice in order of their activity are (1) oxytetracycline, (2) dihydrostreptomycin, (3) penicillin.

*D. Coli-Aerogenes Group.**—Tests were carried out with 18 different strains of this group, and details of their results are given in Table 5 and Chart 4. A summary of these results is the following:

1. In concentration of 12.5 γ per cc., 75% of the strains were completely inhibited by chloramphenicol, 6.6% by dihydrostreptomycin, 50% by oxytetracycline, and none by chlortetracycline.

2. In concentrations of 12.5 mg. per cc. sulfadiazine was effective in 1.25% of the strains.

* Paracolon bacilli have also been included in this group.

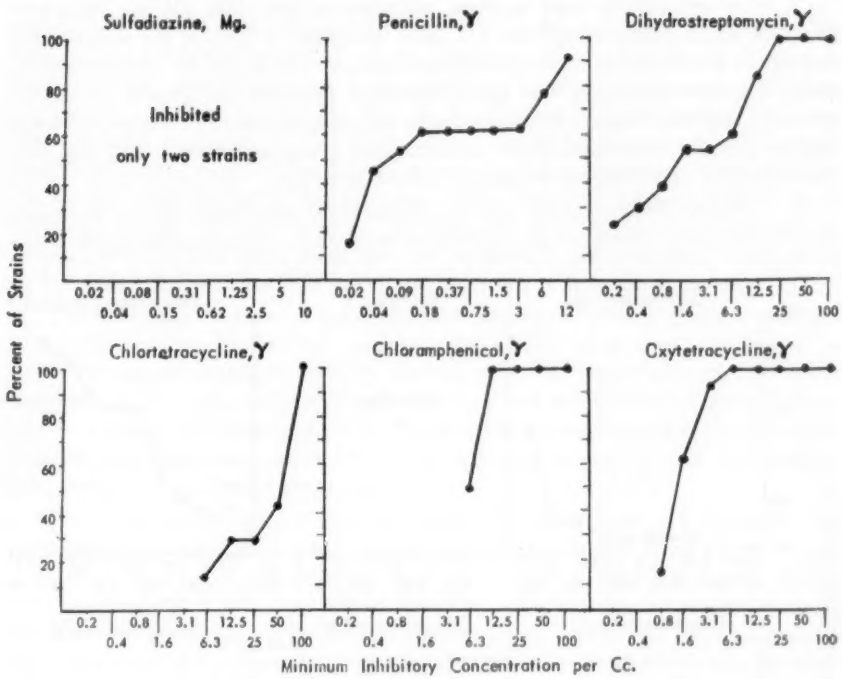

Chart 3.—Results of studies of sensitivity of Staphylococcus pyogenes.

TABLE 5.—*Results of in Virto Tests for Sensitivity of Eighteen Strain of the Coli-Aerogenes Group*

Strain, No.	Organism	Concentration Necessary for Total Inhibition, γ/Cc.* Sulfadiazine	Penicillin	Dihydrostreptomycin	Chlortetracycline (A) or Chloramphenicol (C)		Oxytetracycline
1	B. lactis aerogenes.....	R †	3	25	A	R	25
2	B. lactis aerogenes.....	R	R	3.1	A	R	R
3	B. lactis aerogenes.....	R	R	0.8	A	R	3.1
4	B. lactis aerogenes.....	10	R	3.1	A	50	6.3
5	B. lactis aerogenes.....	R	R	12.5	C	3.1	6.3
6	B. lactis aerogenes.....	R	R	100	C	50	R
7	Str. lactis	2.5	R	1.6	A	100	25
8	Str. lactis	R	R	3.1	A	100	25
9	B. coli communior.....	10	R	25	A	R	R
10	B. coli communior.....	R	R	3.1	A	50	3.1
11	B. coli communior.....	10	R	1.6	C	6.3	12.5
12	B. coli communis.....	0.08	R	3.1	A	R	12.5
13	Paracolon bacilli.....	R	R	50	A	100	R
14	Paracolon bacilli.....	10	R	0.4	C	6.3	25
15	Paracolon bacilli.....	10	R	0.4	C	12.5	6.3
16	Paracolon bacilli.....	R	R	100	C	50	R
17	Paracolon bacilli.....	10	R	25	C	12.5	12.5
18	Paracolon bacilli.....	10	R	0.4	C	3.1	12.5

* Concentration of sulfadiazine is expressed in milligrams per cubic centimeter.
† R, strain was resistant to concentration used.

3. In concentrations used in these experiments, penicillin did not have any effect on these strains except one (B. lactis aerogenes); 50% of the strains were insensitive to chlortetracycline, 50% to sulfadiazine, and 27.5% to oxytetracycline, while dihydrostreptomycin and chloramphenicol inhibited the growth of all the strains. From these results the drugs can be arranged in order of their effectiveness against the isolated strains of the coli-aerogenes group as follows: (1) chloramphenicol, (2) dihydrostreptomycin, (3) oxytetracycline.

E. Viridans Type of Streptococcus.—Sensitivity was tested in one organism, and the following results are arranged in order of efficiency and minimum inhibitory

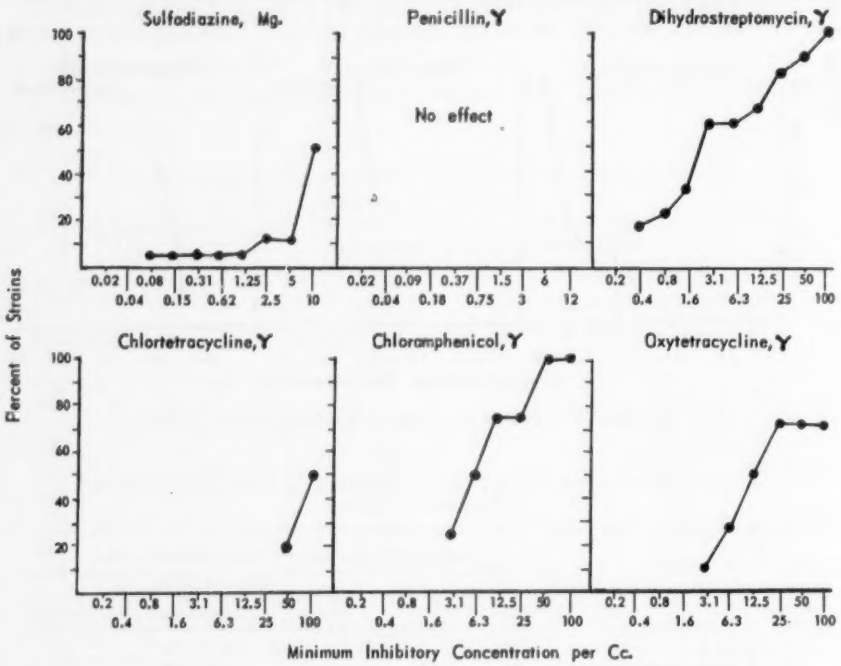

Chart 4.—Results of studies of sensitivity of the coli-aerogenes group.

concentrations: (1) oxytetracycline, 1.6 γ; (2) penicillin, 6 γ; (3) chloramphenicol, 6.3 γ; (4) dihydrostreptomycin, 25 γ; (5) sulfadiazine, no effect.

COMMENT

From this bacteriological and experimental study we found that the organism most responsible for chronicity is P. vulgaris (45.3%), and the one ranking second is B. pyocyaneus (19.4%). Hayes and Hall [3] have found B. pyocyaneus to be the organism most often responsible for chronic ear discharge. In our series there was no significant difference in the nature of organisms isolated during summer and winter.

The organisms isolated from acute suppurative otitis media by various researchers are rather different from those present in chronic suppurative otitis media. It was

therefore essential to determine the source of these organisms responsible for chronic suppurative otitis media, as the nasopharynx revealed the same flora in both acute and chronic suppurative otitis media. The other three sources should be the external auditory meatus, the skin, or the dressing material used in the treatment of acute suppurative otitis media. From the study of the external auditory meatus in normal ears and those with recently healed perforations, it appears that the source could mainly be the dressing material used in the treatment of acute cases; therefore the clinician must be prepared to accept a certain amount of responsibility for this mishap, as the only safeguard against chronic suppurative otitis media is the efficient and intelligent treatment of it in the acute stage.

The anatomical features of the middle-ear cleft leave no doubt that the infection can linger in any of its crevices, especially when most of the treatment has to be done through the external auditory meatus. This can easily explain the recrudescences and relapses, although the resistance and insensitivity of bacteria may also be a factor. Our observations of 25 healed cases with dry perforations revealed that the organisms continue to live in the external auditory meatus for a rather long time, even as long as three years.

The sensitivity tests were illuminating, as they changed our old concept of the treatment of chronic suppurative otitis media. The organism most commonly found, i. e., P. vulgaris, was discovered to be most vulnerable to dihydrostreptomycin, next to chloramphenicol, and third to penicillin. Our findings differ from those of Lutz and his associates,[4] who also carried out these tests by the dilution method with 50 strains of P. vulgaris. They concluded that chloramphenicol was the most effective antibiotic, only 2 of the 50 strains being resistant to it. They found great variation in the degree of inhibition produced by dihydrostreptomycin. A fair number of their strains resisted dihydrostreptomycin, and almost all resisted fairly high concentrations of chlortetracycline, oxytetracycline, and penicillin. In our tests dihydrostreptomycin was found to be the most effective against B. pyocyaneus, and chloramphenicol was next best. But Lutz and his associates [4] found their strains of B. pyocyaneus to be most sensitive to oxytetracycline, and nearly all of their strains were resistant to streptomycin. However, one of their findings, i. e., that all their strains were resistant to penicillin, was in agreement with that of ours. In the case of Staph. pyogenes, oxytetracycline was found to be most effective, and this confirms the findings of Andina and Allemann,[1] who tested the sensitivity of 52 strains of hemolytic Staph. aureus by the hole-test method. In our tests chloramphenicol was found to be the most effective against the coli-aerogenes group of organisms, and the next best was dihydrostreptomycin. Viridans type of Streptococcus was found to be most sensitive to oxytetracycline. These variations may be due to the variations in the strains isolated in different regions.

It was then attempted to correlate these results with our clinical examination. The findings were the following:

1. The size and site of perforation and duration of discharge did not effect the bacteriology.

2. Color of discharge was insignificant, except that a frank green color appeared in the presence of B. pyocyaneus.

3. Pus was usually thick, scanty, foul-smelling, and yellowish, irrespective of the nature of the organism responsible for it.

4. Reaction was mostly alkaline or amphoteric. Only two in which Staphylococcus was grown had acidic reactions.

5. Granulation and polypus had no effect on the nature of the bacteriology.

SUGGESTIONS

Prevention is the surest safeguard for sound hearing, since once chronic suppurative otitis media develops some loss in hearing will ensue, and the child must part with some of his efficiency as a member of society, suffering from this handicap during his training and education. Prevention is easy, provided the mother is properly instructed.

As the nasopharynx is the main source of acute suppurative otitis media, colds, catarrhs, and sore throats must be prevented, and, once they have developed, they must be properly treated.

Acute suppurative otitis media must be treated efficiently and not be treated by instillation of drops only. The treatment must be persued for at least a year after all discharge has disappeared.

Middle-ear cleft from the point of view of infection should be regarded as like the nasopharyngeal sinus, in which infection is easy to contact but difficult to eradicate.

Once chronic suppurative otitis media has occurred, the antibiotic treatment recommended should be given a fair trial after a thorough examination of the mastoid, throat, nasopharynx, and sinuses.

Where culture facilities exist, we advise making a culture of the aural discharge in every patient suffering from chronic suppurative otitis media before the institution of any treatment. Sensitivity tests can be omitted. On the strength of the present report, the following line of action is suggested:

1. If P. vulgaris and B. pyocyaneus are present, 5% dihydrostreptomycin drops (1 gm. dissolved in 20 cc. of distilled water) should be used at two-hour intervals. If B. pyocyaneus is present, 10% sulfadiazine may be used every two hours.

2. If Staph. pyogenes and viridans type of Streptococcus are present, drops of oxytetracycline (0.5%) should be instilled at two-hour intervals.

3. If the coli-aerogenes group is present, the administration of 0.5% chloramphenicol is recommended—two to three drops at two-hour intervals.

Where there are no facilities for culture of the aural discharge, the administration of dihydrostreptomycin drops is suggested, as this is the only drug which inhibited all the 100 organisms on which sensitivity tests were performed. If this treatment proves ineffective in three to four days, oxytetracycline drops (0.5%) may be used with the dihydrostreptomycin drops.

The frequency of application may be reduced after amelioration of the symptoms.

Stress, however, should be laid on aseptic cleaning of the ears two to three times a day, depending on the amount of discharge.

When the ear becomes dry, wet treatment should be replaced by the insufflation of the following powder: dihydrostreptomycin, oxytetracycline, and sulfadiazine, 20 gm. each.

This treatment should be continued for at least a year. This prolonged treatment is essential to guard against relapses, as it was found that P. vulgaris persisted at least for 1 month, B. pyocyaneus for 11 months, and B. lactis aerogenes for 15 days, and Staph. pyogenes may linger for as long as three years after the ear has dried. The nose, nasopharynx, and throat will also need periodical check-ups.

The dressing material used in the treatment of acute and chronic suppurative otitis media should, of course, be sterile and aseptic.

Iontophoresis with antibiotics may give better results, as the medicine would then reach all areas of infection.

If a patient has granulations, polypi, cholesteatoma, mastoid sinus, and bony involvement, surgical interference, in addition to the antibiotic treatment, is the method of choice.

The use of antibiotics has almost eliminated prolonged dressings of the ear and wound after mastoidectomy and has markedly shortened the stay of the patient in the hospital, i. e., 2 weeks in place of 12.

SUMMARY

A study of 150 cases of chronic suppurative otitis media is presented. It covers bacteriology and sensitivity of the bacteria isolated to sulfadiazine, penicillin, dihydrostreptomycin, chlortetracycline (Aureomycin), chloramphenicol (Chloromycetin), and oxytetracycline (Terramycin).

Dihydrostreptomycin was found to be most effective against Proteus vulgaris and Bacillus pyocyaneus, oxytetracycline against Staphylococcus pyogenes and viridans type of Streptococcus, and chloramphenicol against the coli-aerogenes group.

Dihydrostreptomycin is the only drug which inhibited the growth of all the organisms.

Out of 150 cases of chronic suppurative otitis media, nasopharyngeal flora were studied in 25 cases.

In 25 cases with dry perforation, the organisms were isolated from the external auditory meatus.

No pathogenic organism was grown from the external auditory meatus of 25 normal ears.

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CONGENITAL LARYNGEAL STRIDOR

A Diagnostic Study Including Technique of Tracheobronchography in Infants

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CHRONIC stridor in infancy is a symptom of great interest to lay people as well as physicians because it is so noticeable. It appears at birth or shortly thereafter and may persist for one or two years. The otolaryngologist is usually called upon to examine the patient early to determine the cause of stridor, which in most instances is a benign disorder termed congenital laryngeal stridor. Other causes of chronic stridor are apt to be serious and, unless recognized early, may not prove amenable to treatment.

Most of the causes of noisy breathing can readily be diagnosed by careful examination of the nose, mouth, pharynx, and larynx. Direct laryngoscopy is essential in the diagnosis of the laryngeal causes of stridor but will not reveal the etiology of stridor arising in the trachea or bronchi. In the latter sites, it is necessary to resort to either bronchoscopy or tracheobronchography for further visualization.

A very important cause of stridor is constriction of the trachea or a large bronchus by a ring type of congenital anomaly of the aorta or its branches. The success of surgical treatment of these anomalies depends upon early diagnosis. It is therefore essential that the otolaryngologist be familiar with them and with the methods of diagnosing them.

The present study includes a review of 83 cases of congenital laryngeal stridor. A survey of the literature has been made and is presented. The differential diagnosis of stridor is discussed. A technique for tracheobronchography is described, and its importance in the diagnosis of stridor is demonstrated by two case reports.

HISTORICAL ASPECTS

There is an abundance of literature on the subject of congenital laryngeal stridor. Rilliet and Barthez [1] in 1853 described the picture of congenital laryngeal stridor in their textbook on diseases of children. Lees [2] in 1883 gave the first accurate description of such a case with obstructed inspiration. His patient subsequently died of diphtheria, and the larynx was examined post mortem. He described the epiglottis as being curled inward, with the aryepiglottic folds in such close proximity that they seemed to be in actual contact. He stated that he had seen four other cases with the same condition. Gee [3] in 1884 discussed

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Presented as a candidate's thesis in partial fulfillment of the requirements for membership in the American Laryngological, Rhinological and Otological Society, Inc.

12 cases of respiratory "croaking" in babies. He observed a fact that still holds today, namely, that the noisy breathing is more disturbing to others than to the child. Thomson [4] in 1892 described a group of cases of laryngeal stridor which ran a benign and self-limiting course. He believed that the stridor was due to a central functional disorder with a disturbance in the coordination between the thoracic muscles and laryngeal muscles akin to that in stammering. Sutherland and Lack [5] in 1897 described 18 cases of congenital laryngeal stridor, 6 of which were examined by mirror laryngoscopy. They described the epiglottis as being folded backward with approximation of the aryepiglottic folds. The thin folds flapped to and fro on respiration. They were convinced that there was a valvular action of the upper aperture of the larynx. This action, they believed, was dependent on a peculiar congenital malformation and partly on flaccidity of these parts in the infant. Their explanation is the accepted view today. Others, such as Variot [6] and Ballin,[7] also found abnormalities of the larynx similar to those described by Sutherland and Lack.

Thomson and Turner [8] in 1900 made a study of the larynx of normal infants. They applied suction to the lower part of the larynx of a cadaveric infant and found that the structures at the upper aperture of the larynx were so soft that the sides of the aperture were sucked together and the epiglottis was drawn down as a lid. Their article is well illustrated and shows what happens when negative pressure is applied below the larynx.

Reardon [9] also described softening of the structures of the aperture of the larynx and expressed the same view as that held by Sutherland and Lack.[5]

Hill [10] points out that the embryology and histology of the structures of the upper aperture of the larynx are different from the remaining parts of the larynx. He shows that there is reason for variation and malformation which can produce congenital laryngeal stridor and that a local condition, rather than a central disturbance, is the cause of the stridor.

Arey [11] states that the larynx develops somewhat differently in its upper and lower halves. The lower portion forms around the stem of the trachea, whereas the part above the vocal folds rises out of the pharyngeal floor in the region of the primitive glottis. Jordan and Kindred [12] state that the epiglottis and aryepiglottic folds arise from the furcula, which is a crescentic fold lying caudal to the tuberculum impar at the level of the third pharyngeal arches ventrally.

Heatly [13] and Tucker [14] have described the anatomy of the larynx of the infant. The larynx is developed at birth and slowly increases in size until puberty. In infancy the larynx occupies a higher position, its lower border being at the fourth cervical vertebra. With growth the larynx descends to a lower position until in the adult the cricoid reaches the level of the sixth or seventh cervical vertebra.

Holinger and Johnston [15] and Tucker [14] have found the triangular aperture of the larynx to be 7 mm. in the anteroposterior dimension and 4 mm. in width across the posterior commissure.

Holinger and Johnston,[15] in studying the factors responsible for laryngeal obstruction in infants, found that congenital anomalies are the commonest cause. Also, they pointed out that it is possible for a chest deformity to develop as a result of congenital laryngeal stridor if the laryngeal obstruction is severe enough and of sufficient duration. Clerf,[16] in a discussion of their paper, cited a case of

congenital laryngeal stridor which necessitated a tracheotomy at 2 months of age to relieve respiratory obstruction. Prior to tracheotomy, the infant had a typical chicken-breast deformity. After tracheotomy, there was normal chest development. Decannulation was done when the patient was 16 months of age.

An additional factor in the etiology of congenital laryngeal stridor is the fact that the entrance to the infant larynx [14] is at an angle from behind forward and downward to the glottic lumen. Exaggeration either of this angulation or of the degree of softening of structures of the upper aperture of the larynx will cause inspiratory stridor and obstruction without difficulty in exhalation.

Schwartz [17] believes that a better term for congenital laryngeal stridor would be inspiratory laryngeal collapse, which is the essential feature of the condition. Also, he reported several cases in which micrognathia was associated with congenital laryngeal stridor, and he believes that the micrognathia played a casual role.

Iglauer [18] reported a case in which removal of the epiglottis gave relief from attacks of stridor. Hasslinger [19] reported three cases in which an edematous ridge of mucous membrane in the aryepiglottic folds caused obstruction and stridor during inspiration. He removed the ridge in two of the three cases, with relief of symptoms. Montreuil [20] reported a case of bifid epiglottis. The patient had marked inspiratory stridor and obstruction. Tracheotomy was necessary to relieve the obstruction. Subsequent removal of the flapping halves of the epiglottis gave complete relief from the stridor and obstruction. Montreuil cited 16 other cases in the literature. Schwartz [17] also discussed a case in which partial removal of the epiglottis gave relief from stridor and obstruction.

Trimby [21] discussed the confusion between congenital laryngeal stridor and enlarged thymus. There exists a tendency to blame most cases of stridor on thymic disease, particularly if there seems to be x-ray evidence of thymic enlargement.

Bowman and Jackson [22] reviewed 30 cases of congenital stridor in infancy and found that congenital laryngeal stridor was the commonest cause of stridor in their series. In their group, 21 had an x-ray diagnosis of enlarged thymus and 19 had x-ray therapy, with 5 showing some improvement.

Kennedy and New,[23] in their series of 30 cases of stridor, reported that 15 of the patients had congenital laryngeal stridor and that 9 of the 15 remaining cases had an enlarged thymus. Eight of the nine were benefited by x-ray therapy.

Caffey [24] gives a complete discussion of the thymus gland and its relation to sudden death. He feels that there is grave doubt that even the largest thymus can cause obstructive dyspnea or cyanosis. He points out that careful studies of patients with obstructive symptoms usually demonstrate the cause of the obstruction to be a congenital lesion of either the respiratory or the cardiovascular system.

Unfortunately, the roentgen diagnosis of enlargement of the thymus often tends to discourage the further investigation necessary for complete diagnosis and treatment. It should not.

FINDINGS IN EIGHTY-THREE CASES OF CONGENITAL LARYNGEAL STRIDOR

In agreement with the cases reported by other writers, the cases reviewed showed that the stridor commences at or soon after birth and usually disappears during the second year of life. The infant is usually in good health and seems to suffer no discomfort from the stridor.

The sound of the stridor varies; it may have a soft purring quality, or it can be a croaking noise. Usually the sound has a crowing character that varies in degree and quality. The stridor is loudest on inspiration and may be absent on expiration. There may be periods in which the stridor is entirely absent. The noisy breathing usually diminishes when the infant is quiet or asleep. When the infant is aroused or excited or is being fed, the stridor is increased. The cry is clear, and there is no hoarseness unless secretions are momentarily caught in the larynx.

The degree of respiratory obstruction, as manifested by retraction of the thorax and epigastrium, varies. It may be absent, or infrequently it can be quite marked. In few instances, a tracheotomy may be necessary for relief of the obstruction.

Data on Eighty-Three Patients with Congenital Laryngeal Stridor

	Patients, No.
Sex	
Male	58
Female	25
Age at Onset of Stridor	
At birth	69
2 weeks	10
6 weeks	4
Methods of Investigation	
Prior to 1946 (10-year period beginning January, 1936) (37 patients)	
Direct laryngoscopy	37
Direct laryngoscopy and bronchoscopy	4
After 1946 (46 patients)	
Direct laryngoscopy	46
Direct laryngoscopy and tracheobronchography and esophageal study	19
Direct laryngoscopy and esophagram without tracheobronchogram	3
Findings at Direct Laryngoscopy	
Congenital laryngeal stridor (exaggerated infantile larynx, inspiratory laryngeal collapse)	76
Large broad epiglottis	3
Large aryepiglottic folds	2
Bifid epiglottis (Montreuil's [20] case)	1
Macroglossia and congenital laryngeal stridor	1

As a rule, however, there is no cyanosis, and if attacks of cyanosis occur, great care in making a diagnosis is indicated, since the degree of respiratory obstruction in congenital laryngeal stridor is seldom of such severity.

Direct laryngoscopy is the most valuable aid in the diagnosis of the condition. The epiglottis is usually of an exaggerated infantile type. It has been called "omega-shaped." It is long, and its lateral margins are folded backward, causing an approximation of the aryepiglottic folds. On inspiration, the entrance to the larynx is greatly reduced. The noise is produced by vibration of the loose connective tissue of the aryepiglottic folds and the loose tissue over the arytenoids, which are sucked inward on inspiration.

Differential diagnosis of congenital laryngeal stridor from other laryngeal affections is simplified by direct laryngoscopic examination. The otolaryngologist also has to keep in mind other causes of noisy breathing, including choanal atresia, micrognathia, macroglossia, and even postnasal drip. In the larynx, cysts,

webs, laryngeal stenosis, neoplasm, and foreign bodies have to be ruled out. In the trachea and bronchi, tumors, congenital anomalies of the cardiovascular system, and defects of the tracheal wall require consideration.

The differential diagnosis between congenital laryngeal stridor and stridor due to a vascular ring may offer a difficult challenge to the otolaryngologist. Textbooks of otolaryngology seldom mention vascular anomalies as a cause of stridor. It is of interest that most early articles on this subject appeared in pediatric and surgical journals rather than in otolaryngological periodicals.

The laryngologist is usually called upon to see an infant with stridor early in the case. He has the responsibility of making a quick and accurate diagnosis. Too often, the diagnosis of congenital laryngeal stridor is made without even a direct laryngoscopic examination. Again, stridor and respiratory obstruction are frequently attributed to an enlarged thymus, and the basis of the diagnosis is an x-ray film of the chest. Infants are given radiotherapy, which may or may not afford relief, but diagnosis should not be based on the finding of an enlarged thymic shadow in the x-ray film. Tracheobronchography can be of great value in the differential diagnosis of stridor and should be used wherever direct laryngoscopy does not reveal an obvious lesion or anomaly above the vocal cords.

Respiratory obstruction in three cases was severe enough to necessitate tracheotomy.

One case in this series, reported by Montreuil,[20] with a bifid epiglottis was treated by amputation of both halves of the epiglottis, with an excellent result.

In the entire group, there were five patients in whom the stridor was attributed to an enlarged thymus, and x-ray treatment was administered, without benefit. Subsequent direct laryngoscopy conclusively established the cause of the noisy breathing to be congenital laryngeal stridor.

IMPORTANCE OF STRIDOR IN RELATION TO CONSTRICTING VASCULAR RING

It is noteworthy that more cases were referred for examination in the period from January, 1946, to September, 1953, than in the preceding 10 years. This is attributed in part to the greater interest in the diagnosis and treatment of anomalies of the aorta and other vessels which may form a constricting vascular ring about the trachea, esophagus, or a main bronchus. Gross,[25] Gross and Ware,[26] and Neuhauser [27] are chiefly responsible for this increased interest.

In 1945 Gross [25] reported the first case of constricting vascular ring which was successfully treated. His patient had had irradiation therapy without benefit for an enlarged thymus gland because of the stridor and obstruction. Subsequent studies, including iodized oil (Lipiodol) instillation, revealed a constriction of the trachea. In 1946 Neuhauser [27] described in detail the roentgen diagnosis of double aortic arch and other anomalies.

In 1940 Schall and Johnson [28] described a case of dyspnea due to congenital anomaly of the aorta. This patient had noisy breathing, dyspnea, and cyanosis. X-ray studies were negative. Laryngoscopy showed some redness of the posterior surface of the arytenoid. Bronchoscopy was performed, and stenosis of the trachea was found. It was necessary to do a tracheotomy after removal of the bronchoscope. The child had a hemorrhage, and death occurred after 10 days. Autopsy showed a right and a left aortic arch taking their origin from a common trunk. The right

aortic arch crossed over the trachea. In 1943 Herbut and Smith [29] reported a case of constricting double aortic arch. Bronchoscopy, performed as a diagnostic procedure, revealed the trachea to be constricted near the carina. Tracheotomy was performed, but the child subsequently died.

In 1947 Gordon [30] stressed the diagnostic significance of increase in stridor and attacks of obstructive dyspnea with cyanosis precipitated by feeding. He cited the writing of von Siebold [31] in 1837. Von Siebold wrote of an infant who died at 10 days of age. From birth the infant had attacks of stridor, dyspnea, and cyanosis whenever he was fed. The infant was found to have a double aortic arch, which caused the marked stridor and dyspnea while feeding.

Sweet, Findlay, and Reyersbach [32] (1947) pointed out that considerable confusion exists concerning the etiology of stridor. They discussed the various causes and means of diagnosis, with particular reference to the diagnosis and treatment of esophageal obstruction due to a congenital vascular ring.

Fray [33] and Faber, Hope, and Robinson [34] have described the effects of a persistent right aortic arch. Faber and his associates point out that a right aortic arch is a definite cause of stridor. The patient with a right aortic arch is usually referred because of noisy breathing, which may be present at birth. A diagnosis of enlarged thymus is frequently made on the basis of x-ray findings. The patient usually experiences respiratory difficulty while feeding. The authors state that the serious danger to infants with stridor is respiratory infection.

When stridor is present in infants with a broad shadow in the upper mediastinum, thymic enlargement should not be accepted as the cause until persistent right aortic arch has been excluded.

Holinger, Johnston, and Zoss [35] in 1948 made a thorough study of tracheal and bronchial obstruction due to congenital cardiovascular anomalies. They point out that malformation of the heart or anomalies of the aorta and its main branches are a cause of obstruction. In heart anomalies, there is apt to be compression of the left main bronchus. They believe that the double aortic arch, or so-called vascular ring, is a very frequent cause of congenital respiratory tract obstruction. The trachea and esophagus become surrounded by an arterial ring of small diameter. The aorta divides into a right and left branch passing to either side of the trachea and esophagus and reuniting posteriorly to form the descending aorta. The vessels pursue a diagonal course, so that the left branch is anterior and the right more posterior. A right aortic arch anomaly is the result of a persistent fourth right aortic arch; the aorta then arches over the right main bronchus and courses downward to the right or behind the esophagus instead of taking its normal course to the left and in front of the esophagus.

Holinger and his associates [35] show that encirclement of the trachea and esophagus is possible if an aberrant ductus or ligamentum arteriosum is attached to a part of the right aortic arch or to a remnant of the fetal left fourth arch. They report that anomalies of the left common carotid artery and also the left subclavian artery can cause compression of the trachea or esophagus.

Holinger, Johnston, and Basinger [36] in 1950 reported 29 cases of benign tracheal stenosis. They discuss six types of congenital stenosis due to anomalies of the tracheal wall. They describe a case showing the effect of a right aortic arch and mention eight other instances of severe tracheal stenosis caused by congenital anomalies of the aorta.

I reviewed the case histories of six infants with congenital anomalies of the aorta. Five of the patients had a definite history of stridor along with attacks of cyanosis and dysphagia during feeding. Paroxysmal attacks of dyspnea usually took place and were frequently precipitated by disturbing the child. Two of these cases are reported in detail below.

REPORT OF CASES

CASE 1.—W. R., a boy aged 1 year, was admitted to the hospital on Oct. 8, 1951, with the history of stridor since birth and paroxysmal cough of four days' duration. The family history was noncontributory.

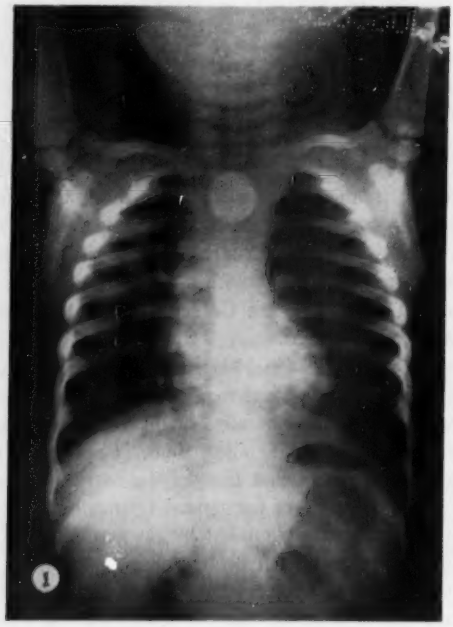

Fig. 1.—Penny lodged in esophagus below suprasternal notch.

Past History.—The child had always been a noisy breather. He had had several attacks of moderately severe cyanosis associated with inability to breathe. He had had many upper respiratory infections. His stridor had been treated by the local physician, who had attributed it to a small larynx. He had been seen in another hospital and was said to have an enlarged thymus and received three x-ray treatments; however, the noisy breathing had continued.

Examination.—The mother had brought the child to the clinic three days before admission because of the marked difficulty in breathing for one day and because of his stridor since birth. On the day of admission, an x-ray was made, and a foreign body (coin) was seen in the esophagus at the level of the arch of the aorta (Fig. 1). There was no history of the child's having swallowed a coin.

Examination revealed a fairly well-developed and well-nourished child, who was quite irritable. His color was good. His trachea was questionably deviated to the left; there was no retraction. On percussion the chest was resonant, and breath sounds were transmitted well.

Laboratory tests revealed a hemoglobin content of 9.9 mg. per 100 cc., 3,300,000 erythrocytes, 15,100 leucocytes, with 51% polymorphonuclear leucocytes, 48% lymphocytes, and 1% eosinophiles. Urinalysis was negative.

Course.—Esophagoscopy was performed on Oct. 9, 1951, and a foreign body, a penny, was found in the esophagus below the suprasternal notch. The stridor persisted, and two days later, a laryngoscopy was performed, with normal findings, and a tracheogram was made, which showed constriction of the trachea (Fig. 2). An esophagram showed compression of the esophagus at the level of the arch of the aorta (Fig. 3). A diagnosis of a vascular ring anomaly was made. It was felt that the foreign body had become lodged at the site of the constrictive ring.

The patient was transferred to the surgical service. An exploratory operation by Dr. George Humphreys revealed a double aortic arch. The larger arch was found to pass posteriorly. The smaller anterior arch, which completely encircled the trachea and esophagus, gave off a left carotid artery and a left subclavian artery. The descending portion of this arch passed into the

Fig. 2.—Tracheobronchogram showing constriction of lower part of trachea.

Fig. 3.—Esophagram showing constriction of esophagus at level of aortic arch.

right chest. An obliterated ductus was found opposite the left subclavian artery. The anterior arch was ligated and separated. Postoperatively, the child did very well and gradually improved in his general condition He continued to have moist cough, but this gradually diminished, and he became more active and happy. He was discharged on his 37th hospital day, and he remained well.

Diagnosis.—The diagnoses were foreign body in the esophagus; congenital vascular malformation: double aortic arch.

Operation.—Operation consisted of removal of the foreign body and ligation of the double aortic arch.

CASE 2.—K. H., a girl, aged 7½ months, was first admitted to the hospital in January, 1949, with complaints of stridor and attacks of cyanosis. The family history was essentially negative. Her nutritional history and development were normal. Two weeks prior to this first admission, the child was admitted to another hospital, where an operation for intussusception was done. The postoperative course was uneventful. Three weeks after birth she developed stridor. She was

quieter when asleep. On the day of her admission, there was a cyanotic episode lasting 10 minutes following feeding. Examination revealed an infant who had noisy respirations but with chest retraction. There were coarse rhonchi throughout the lung fields but no rales. On laryngoscopy, the epiglottis was seen to be elongated and to be sucked into the lumen of the larynx on inspiration. It was felt that the child had congenital laryngeal stridor due to an elongated, flaccid epiglottis. She was discharged with this diagnosis.

Four days after her discharge, she was readmitted. During the interval there was onset of a cough, which became progressively worse. On the day of admission and approximately 14 hours before arrival at the hospital, the child, during her feeding, gasped and turned cyanotic. The color returned, but the child had recurrence of cyanosis during other feedings. Examination revealed a temperature of 101.6 F. The child appeared mildly ill. Her respirations were noisy as before. There was no evidence of cyanosis. The lungs were filled with scattered rhonchi, and there was slight chest retraction on inspiration. The child ran a moderate fever for four days until sulfadiazine therapy was instituted. The temperature returned to normal and stayed normal throughout the hospital stay. Because of the respiratory distress, the child was kept in oxygen for the first six hospital days. Cyanotic spells recurred, usually during feedings, but were not

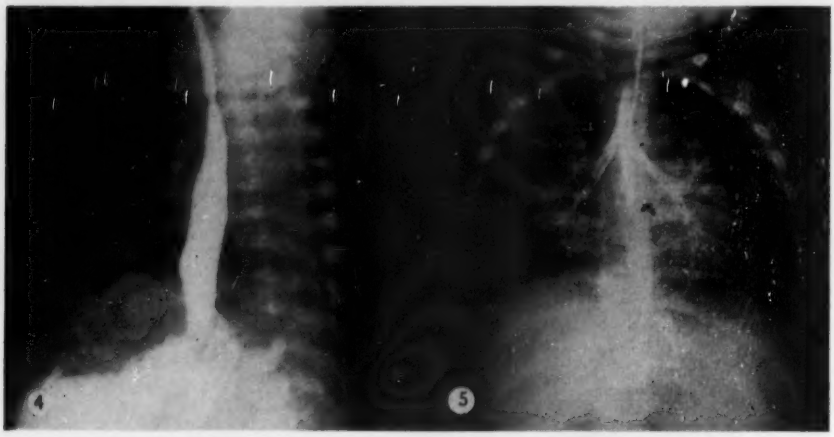

Fig. 4.—Esophagram showing questionable constriction of esophagus at level of aortic arch.

Fig. 5.—Tracheobronchogram (anteroposterior view) showing no evidence of any compression of the trachea or bronchi. Oil is present in the esophagus.

severe. X-ray examination of the chest was said to show no abnormalities. The esophagram was questionably normal (Fig. 4). The tracheobronchogram, however, showed a long deep indentation in the anterior wall of the trachea, probably indicative of compression from the outside (Fig. 5). A second stenosis of the tracheal lumen was noted at the thoracic inlet. It was concluded that this patient had a distinct organic compression at this site which might well be responsible for the symptoms reported clinically. In the third and again in the fifth hospital week, there was a severe episode of cyanosis, each associated with feeding. The cyanosis was accompanied by apnea. Suctioning and artificial respiration were necessary on each occasion. There was return of gasping respirations, and soon the color improved. It was felt that the attacks of dyspnea, cyanosis, and stridor associated with eating were sufficiently characteristic of an anomaly of the great vessels, with possible vascular ring and compression of the trachea and esophagus.

The child was transferred to the surgical service, and retrograde arteriography was done. This examination showed a normal appearance of the aorta and great vessels. There was nothing seen to suggest an anomaly of the vascular tree. Exploratory thoracotomy was postponed because of failure to show a vascular anomaly. For more than a month there were no further episodes of cyanosis, and the child was discharged.

The child was home three days and was then readmitted. There was no difficulty other than cough and noisy respirations until the day of admission. There was no cyanosis, and the chest expanded normally. The lung fields were clear except for coarse rhonchi, both inspiratory and expiratory. The heart was not enlarged. There were no murmurs.

Laboratory tests revealed a hemoglobin content of 10 mg. per 100 cc., 4,200,000 erythrocytes, 13,350 leucocytes, with 26% polymorphonuclear leucocytes, 70% lymphocytes, 3% monocytes, and 1% eosinophiles. Urinalysis was normal.

Course.—On the day of admission there was one cyanotic episode, associated with feeding; the cyanosis was accompanied by apnea. Other than this, the child's hospital course was good. She took feedings well and gained weight. There was a constant stridor. On the 16th hospital

Fig. 6.—Tracheobronchogram (lateral view) showing indentation of the trachea at two separate levels. The esophagus is outlined by the oil. A tentative diagnosis of compression of the trachea due to a vascular ring was made.

day, in an effort to determine the cause of the stridor, an exploratory mediastinotomy was done. The sternum was split, and the mediastinum was entered. Fibrous bands were seen in the region of the left innominate vein. The right innominate artery also crossed diagonally from left to right across the trachea, and a palpable depression of the trachea was present in this area. There was no evidence of an anomalous vascular ring, nor were actual vestigial or aberrant structures noted. At the conclusion of the operation, cardiac arrest occurred. Emergency measures, including cardiac massage, were employed, and after two to three minutes of complete arrest, a regular rate was reestablished.

Postoperative Course.—The child did poorly. She was placed in a helium and oxygen tent. Secretions accumulated in the pharynx, and repeated pharyngeal and tracheal suction failed to relieve the wet, noisy respirations. Respirations were Cheyne-Stokes in nature, and cyanosis accompanied the periods of apnea. At no time did the child respond. The periods of apnea became longer and more frequent. On the third postoperative day, the respirations were shallow, the color pale and gray (even in oxygen), and the skin cold and mottled; and at 10 a. m. on the third postoperative day, the child died. An autopsy was obtained.

Final Note on Autopsy.—This is a case of laryngeal stridor present since the patient was 3 weeks of age. Because of recurrent blue spells with apnea, arteriography was done and followed by an exploratory thoracotomy with thymectomy. During operation there was cardiac arrest. The patient never recovered completely and died 72 hours after operation. A combination of cerebral damage, respiratory obstruction, and bleeding from duodenal ulcers was the cause of death. The postmortem examination revealed the innominate artery crossing the lower portion of the trachea. An attempt to relieve this was made at operation by fixation anteriorly of the innominate artery. Although no gross or microscopic malformation of the tracheal cartilage was seen, the lower portion of the trachea was collapsed, and the cartilages did not show their usual resilience. The anteroposterior diameter was narrow. The epithelium of the trachea was hypertrophic, and in some areas it was not ciliated. The effect of the vessel crossing the trachea must have been secondary only, as this has been encountered in other infants who had no clinical stridor. Fibrinous pleurisy probably resulted from trauma at operation. There was little cellular reaction. Some infection of the operative wound was evident. Of much interest were the acute duodenal ulcers. A moderate clinical anemia was noted, and the gastric contents had a coffee-ground appearance.

Diagnosis.—The diagnoses were congenital stridor, cause undetermined, and tracheal compression, cause undetermined.

Comment.—The importance of tracheobronchography, as well as x-ray study of the esophagus, is well shown in these case reports.

TECHNIQUE OF TRACHEOBRONCHOGRAPHY IN INFANTS

Eeman [37] discussed the technical difficulties of bronchography in infants and young children and also the relatively poor results. Wishart [38] has obtained excellent results by the bronchoscopic method, using general anesthesia and instilling the oil through a bronchoscopic cannula under fluoroscopic guidance.

Heatly [13] and Glaser, Landau, and Heatly [39] reported a case of subglottic stenosis in a 2½-month-old infant, into whose trachea iodized oil was instilled through a laryngoscope. The same technique was used later to demonstrate compression of the trachea by an extrinsic mass.

For the purpose of outlining the trachea and larger bronchi in infants and children up to 2 years of age, excellent results can be obtained by injection of the iodized oil through a laryngeal cannula by means of direct laryngoscopy, without the use of anesthesia.

In 1953, Ferguson and Flake * exhibited a method of tracheobronchography in infants. The technique presented below is in most respects similar to theirs.

Procedure.—The usual equipment necessary to perform a direct laryngoscopy in the infant is required. In addition, a second laryngeal cannula of the Jackson type, having an atraumatic distal end (velvet eye), is prepared so that iodized oil can be instilled through the cannula. A short piece of rubber tubing and an adapter for a Luer-Lok syringe are attached firmly to the proximal end of the cannula.

The patient is placed on an x-ray table. The arms of the infant are placed upward along the sides of the head, and the hands and forearms are restrained by an elastic cotton sleeve. The feet and legs are placed together and restrained by an elastic cotton sleeve. No anesthesia is used.

* Ferguson, C. F., and Flake, C. G.: Bronchoscopy in Infants and Children, The Scientific Exhibit, the 102nd Annual Meeting of the American Medical Association, New York, June 2, 1953.

The x-ray equipment is then made ready so that films of the chest, including the neck, trachea, and bronchi, can be made. The speed at which films are taken is usually 1/30 of a second.

Direct laryngoscopy is performed, and the larynx is carefully inspected for abnormalities or disease. If not enough is found to account for the stridor, then the prepared laryngeal cannula is introduced through the vocal cords into the trachea. Three to five cubic centimeters of warm iodized oil is quickly instilled through the cannula into the trachea. The laryngoscope and cannula are quickly withdrawn, and x-ray pictures in the anteroposterior and lateral projections are taken and immediately developed. If satisfactory films are obtained, no further study is made. If there is not enough oil in the tracheobronchial tree, more oil is instilled and additional x-ray pictures are taken.

Results.—Usually an excellent outline of the trachea and both larger bronchi is obtained. Any constriction or compression of the trachea is easily recognized. Not infrequently, iodized oil is also found in the esophagus on the films. The time consumed is little more than that required for a direct laryngoscopy alone.

SUMMARY

There are many causes for chronic stridor, but congenital laryngeal stridor, a benign and self-limiting disorder, is the commonest cause of noisy breathing beginning at birth or shortly thereafter. There has been very little added to the subject of congenital laryngeal stridor since the original description of Lees [2] and the observations of Thomson [4] and Sutherland and Lack [5] prior to 1900.

Chronic stridor has become a symptom of much greater importance as a result of the contribution of Gross,[25] in 1945, on congenital anomalies of the aortic arch and its branches constricting or compressing the trachea or larger bronchi. The otolaryngologist should be thoroughly familiar with this cause of stridorous breathing, since he will be among the first to be consulted and is best qualified to carry out the necessary diagnostic procedures.

Especially noteworthy and helpful among the latter is tracheobronchography. This is a simple procedure which can be performed at the time of direct laryngoscopy if the patient is on an x-ray table. It requires little time and is relatively free of any complication. In my opinion, tracheobronchography is less dangerous than bronchoscopy for this type of lesion and will yield much more information than looking through a 3-mm. bronchoscope.

An enlarged thymus should not be accepted as the cause of stridor on the basis of x-ray diagnosis alone. When chronic stridor is accompanied by paroxysms of obstructive dyspnea, cyanosis, and dysphagia, and when feeding brings on these symptoms or increases them, a constricting vascular ring should be suspected.

The significance of stridor cannot be overemphasized. Great care should be exercised in making a complete examination and a thorough investigation of each patient.

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BENIGN GIANT-CELL TUMORS OF SKULL AND NASAL SINUSES

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THE ORIGINAL description of giant-cell tumors of bone appears to be buried in several centuries of medical literature, the first case description being variously ascribed to Ambroise Paré [1] in the 16th century and to Sir Astley Cooper in 1818.[2] Giant-cell tumors are fairly common lesions in the long bones, small bones, jaws, and vertebrae of young adults. They appear to be only rarely encountered above the level of the nasal sinuses, since only scattered cases have been reported of their occurrence in the various nasal sinuses, temporal bone, frontal bone, occipital bone, and nasal septum.[9]

Meyerding [3] classifies these tumors as (1) benign and (2) malignant, with further subdivision of the latter into primary and secondary. He makes a further comment that "it is recognized that, after treatment, a benign giant-cell tumor may become malignant." It is of interest that a survey of the literature reveals synonyms such as osteoclastoma, myeloma, and myeloplaxoma for giant-cell tumors of bone.

From an etiologic standpoint, the theories of the basic origin of these lesions are quite varied. They run the gamut of (1) trauma, which has often been indicated as a likely contributing factor, (2) interference with blood supply or inflammatory changes, and (3) neoplastic.

Many authors have found a definite history of trauma in a fair number of cases, ranging from specific instances of trauma to theories of the microtrauma of teeth in the activity of the jaws. However, I am certain that most patients can give a history of trauma to any part of the body in an attempt to explain the formation of a tumor. It is much more ego-satisfying to blame a noxious external agent, such as trauma, than to admit that one's body might be awry in that it is producing a tumor. Levinthal and Kraft,[4] Geschickter and Copeland,* Linde,[7] and many other authors have noted a fairly high incidence of trauma in cases of giant-cell tumor. Other authors presume that the tumor is actually an inflammatory process with the giant cells being foreign-body giant cells.

The most logical of the varying theories, although contradictory, are that of Geschickter and Copeland [5] versus that of Jaffe, Lichtenstein, and Portis.[8] The former authors theorize that giant-cell tumors arise from the abnormal hyperplasia of osteoclasts left at a site of enchondral ossification. The giant cells are presumed to represent osteoclasts, thereby giving rise to the term "osteoclastoma" in foreign literature. Jaffe and co-workers [8] disagree in that the giant cells, while resembling, also show differences from indubitable osteoclasts. They "interpret giant-cell tumor of

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* References 5 and 6.

bone as a neoplasm of a definite kind, arising apparently from the undifferentiated supporting connective tissue of the marrow and clearly delimitable on the basis of its cytology."

Most of the recent articles on the subject of giant-cell tumors above the level of the neck are to be found in journals devoted to oral medicine and surgery. Many of these articles have been reviewed and noted, but they do not add greatly to the subject under discussion. As best I can determine from a survey of the recent literature, the maxilla and maxillary sinuses, after the mandible, are the most frequently reported sites. It is difficult to ascertain a clear-cut distinction as to which cases are primary in the maxilla and which are primary in the maxillary sinus. Many authors believe that the lesion usually starts in the maxilla and then spreads to involve the maxillary sinus and/or hard palate. Giant-cell tumors do not of necessity involve the alveolus. The ethmoid sinuses have been reported as the site of origin in about 13 cases, Wattles [9] reporting the 8th and Handousa [10] reporting the 11th, 12th, and 13th cases. Origin in the sphenoid sinuses has been reported only four times, Echols [11] reporting the third and Handousa [10] reporting the fourth. Similarly, location in the frontal sinuses has also been reported four times, the last case being published by Porta.[12] Giffin and Love [13] report the second case involving the occipital bone. Moffett [14] reports two cases of osteoclastoma, one of which was invasive, but fails to mention the site of the tumors. It is of interest that a history of trauma is relatively infrequent in these cases involving the nasal sinuses, save for the frontals.

The therapy of giant-cell tumor varies considerably, ranging from the old amputations to curettage, excision, use of escharotics, electrocauterization, and irradiation. Excision and irradiation apparently leave much to be desired in the treatment of these lesions as found in the skull and sinuses.

These tumors, common though they are, are obviously unusual in paranasal and skull sites. It is hoped that this survey and the following case reports will stimulate further publication of additional cases.

REPORT OF CASES

CASE 1.—Miss A. K., a well-nourished white woman, 24 years of age, consulted me in March, 1953, because of a swollen right cheek unaccompanied by fever or nasal discharge. There was a previous history of some sense of pressure or slight pain in the area of the right first and second upper molars about six months prior to her initial visit. Dental consultation at that time revealed no pathology, but it was surmised that she had some sinusitis. No history of trauma was elicited.

Intranasal examination revealed only slight mucosal injection. The right nasoantral area appeared slightly prominent as compared with the left. A firm mass, about 3 cm. in diameter, was noted just superior to the roots of the right upper first and second molars in the area of the anterior antral wall. The mass was firmly attached to bone and did not transmit light. Transillumination revealed a dark right antrum. Aspiration of the mass yielded only blood. Right antral irrigation revealed an immediate return of clear fluid. Sinus x-rays revealed clouding of the right antrum. The rest of the physical examination and laboratory studies were essentially normal.

Surgery was performed by me at the New York Eye and Ear Infirmary on April 1, 1953, with the patient under endotracheal anesthesia with supplemental local procaine infiltration. With use of a right sublabial and gingivobuccal incision, a freely bleeding firm tumor mass was exposed overlying the anterior wall of the antrum. By blunt and sharp dissection, it was determined that about 2 cm. of the antral wall was missing and that the tumor already exposed actually arose within the maxillary sinus. The pathologic dehiscence was widened with rongeurs, and the intra-

sinus mass was removed by blunt dissection from its firm attachment to all sinus walls save the medial. A large blood vessel was noted pulsating in a small defect of the posterior wall of the antrum. An intranasal antrotomy was performed and the bleeding controlled by the use of packing. The postoperative course was uneventful, and the patient was discharged from the hospital on the eighth postoperative day.

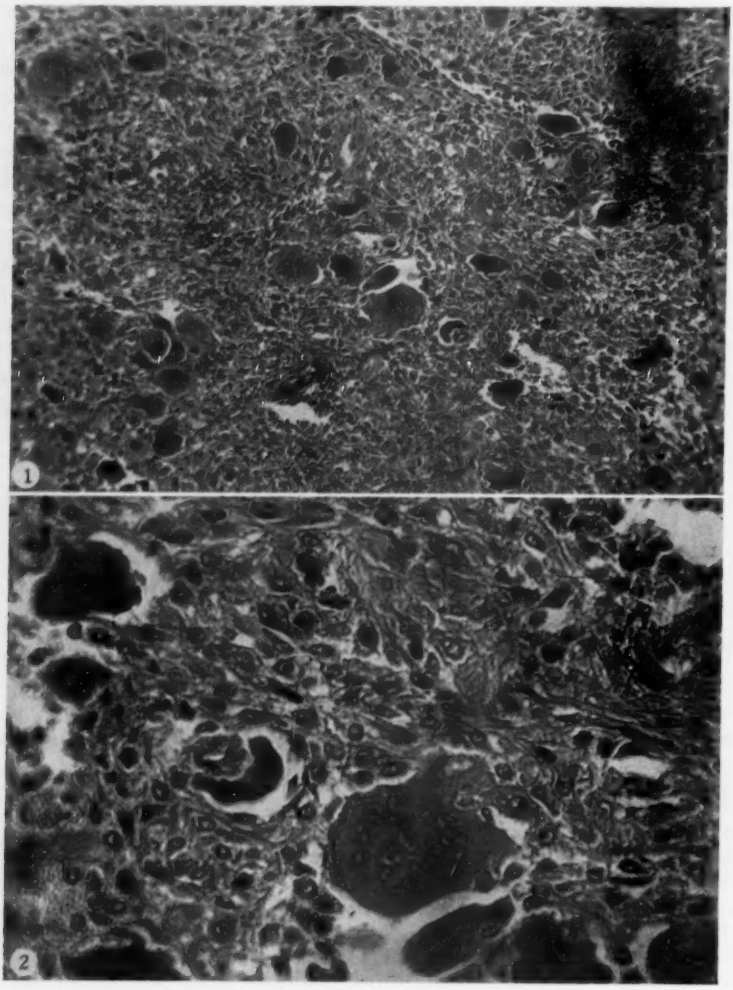

Fig. 1 (Case 1).—Low-power microphotograph showing numerous giant cells in a fibrous stroma.

Fig. 2 (Case 1).—High power showing further detail in multinucleated giant cells.

The tissue was studied by Dr. G. K. Higgins, who reported that the tumor was composed of fibrous elements which were cellular. There was a condensation of acidophilic material resembling osteoid material, which has become poorly calcified in some areas. There were numerous large giant cells scattered irregularly throughout the tissue. The diagnosis was giant-cell tumor of bone.

The patient was last examined in December, 1953. She had enjoyed excellent health since the operation, some eight months earlier. No evidence of recurrence was noted.

CASE 2.—A. W., a 20-year-old Negro youth, was admitted to Beth Israel Hospital (New York) in February, 1952. He stated that he had been in good health until three and one-half years previously, when he developed pain in the occipital and supraorbital areas. These headaches started two months after he had been knocked out in a boxing bout. The headaches were intermittent in character, occurring at intervals of several weeks. About this time, he noticed that his left eye was more prominent than the right and that there was occasional blurring of vision on the same side. After a short time, his right eye also seemed to bulge forward. He complained of somewhat diminished vision on the left. In addition, some impairment of motility was noted in the left eye, accompanied by diplopia on lateral gaze. The patient stated that the nasal airway became increasingly occluded, about one year prior to admission, to the point where respiration was entirely oral.

In 1949, the patient had been admitted to another hospital, at which positive findings were visual acuity of 20/30 on the right and 20/50 on the left, with the fields grossly normal. The

Fig. 3 (Case 1).—X-ray showing clouding of right maxillary sinus.

fundi were normal on the right, but the left showed blurring of the upper nasal and temporal borders. The pupils were unequal, with no light response on the left. Left exophthalmos associated with a homolateral third and fourth nerve paresis, plus a bilateral sixth nerve paralysis, was noted. A skull x-ray was reported as indicating the presence of a chordoma with extensive involvement of the basal skull with both intracranial and nasopharyngeal extension. A cervical node was removed, and adenoidectomy was performed. A tentative diagnosis of middle fossa tumor, either chordoma or lymphoepithelioma, was made, there being no confirmatory tissue diagnosis. A course of x-ray therapy was given, without improvement.

Examination at Beth Israel Hospital revealed definite temporal loss in the left visual field in addition to the above findings. Left sixth nerve paralysis was noted, with diplopia on left lateral gaze. The left pupil reacted poorly to light. Bilateral proptosis was present, more pronounced on the left. Visual acuity was 20/30 on the right and 20/40 on the left. Skull x-ray showed "marked destruction of the floor of the sella turcica, which seems to make a continuous cavity with the sphenoid sinuses. There is a rounded mass inferior to the sphenoid bone projecting into the posterior nasopharynx. The optic foramina views show a large destruction of the left sphenoid bone in the region of the foramen."

Otolaryngologic consultation by Dr. M. Som revealed the presence in both nasal fossa of firm easily bleeding masses covered by intact mucosa. These tumors appeared to arise from the region of the middle turbinate and superior meatuses. No mass was noted in the nasopharynx. Biopsy specimens were taken from the nasal masses.

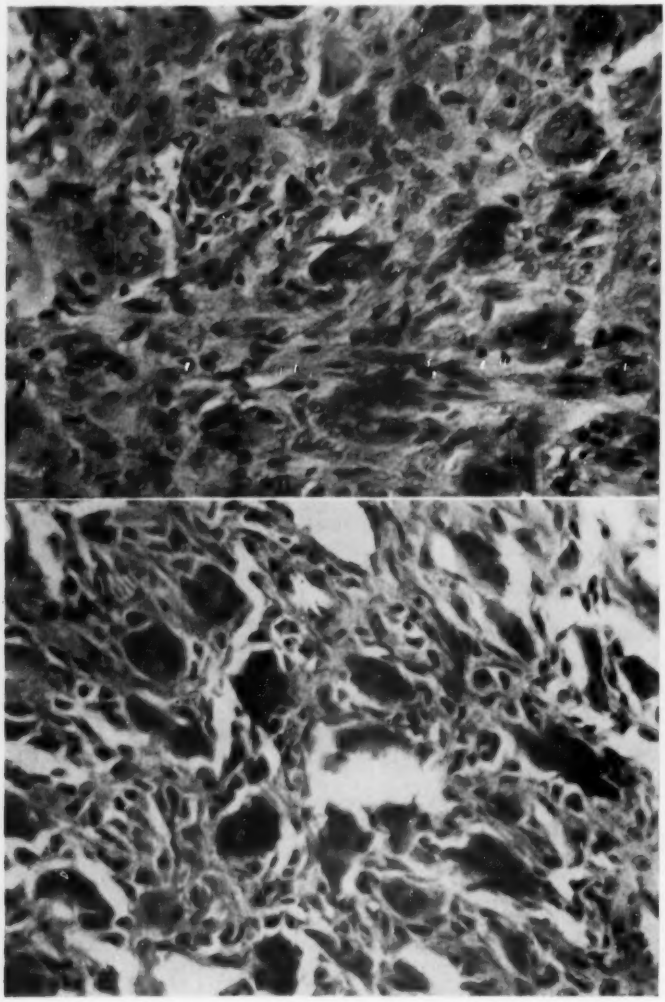

Fig. 4 (Case 2).—Two views revealing cellular detail and fibrous stroma.

The tissue pathology report by Dr. D. Dreizin is as follows: "The specimen consists of tumor tissue, the majority of which is lined by transitional epithelium, below which is a layer of fibrous tissue and bone. The marrow spaces show increased fibrosis. Beneath the bone there is a zone of fibrous tumor with numerous giant cells. In places the cells are in proximity to the previously described normal bone. The matrix of the tumor consists primarily of a fibrous stroma varying from loose to dense in appearance; in places this tissue is highly vascularized. The giant

cells are multinucleated and numerous. The cytoplasm is abundant and eosinophilic. No mitotic figures are noted. In places leucocytes and monocytic cells are present. The tumor mass is well delimited and surrounded by dense fibrous tissue.

"The exact nature of this tumor is difficult to determine. It resembles the giant-cell tumors described in long bone."

Reexamination in November, 1953, revealed no significant changes intranasally. The nasopharynx appeared to be within normal limits despite the x-ray findings. The eye was still proptosed. Repeat x-rays revealed further mild progression of the tumor. The patient's symptoms were unchanged.

CASE 3.—A well-nourished white woman 21 years of age was admitted to the Manhattan Eye, Ear and Throat Infirmary in April, 1952. She gave a history that during the previous two to three weeks her right eye had begun to protrude after an upper respiratory infection. There were no other complaints.

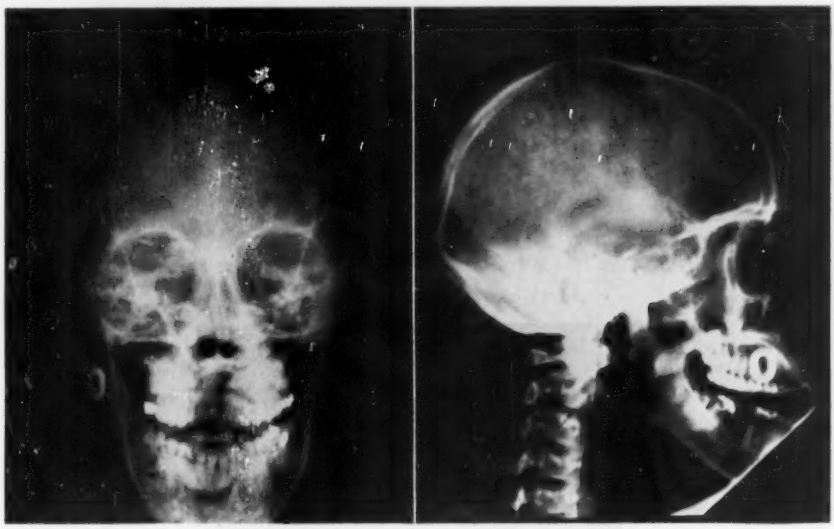

Fig. 5 (Case 2).—Skull x-rays showing destruction of floor of sella turcica with projection of mass into the nasopharynx and ethmoid sinuses.

Physical examination was normal save for the ocular findings. Vision was 20/40 bilaterally, and all muscle action was good. No diplopia was noted on lateral or medial gaze. The left eye was normal, but the right eye showed exophthalmos with downward displacement. The muscular area of the right eye showed only some tension lines radiating temporally from the optic disc.

Multiple laboratory examinations revealed only the presence of a mild hypochromic anemia.

X-ray studies showed an area of decalcification and erosion in the roof of the right orbit. This area extended medially and laterally with relation to the vertical midplane and partially involved the lesser wing of the sphenoid. The right frontal sinus and right ethmoids showed moderate cloudiness. The right antrum was very cloudy and showed thickened membranes. The chest and long bones were negative.

An external frontoethmoid operation was performed about 10 days after admission. An incision was made below the right eyebrow along the orbital rim, and the medial wall and roof of the orbit were exposed by means of sharp and blunt dissection. Tumor tissue was found above and behind the orbital globe. A dehiscence was encountered in the orbital roof about 1 cm. posterior to the frontal sinus, but the dura was found to be intact. The dehiscence was enlarged with bone rongeurs, and a considerable amount of tissue was removed. A routine frontoethmoid

exenteration was then performed. A small mucocele was noted in the right frontal sinus, and the mucosa of the ethmoids was polypoid. Convalescence proceeded uneventfully, the operative wound healing by primary intention.

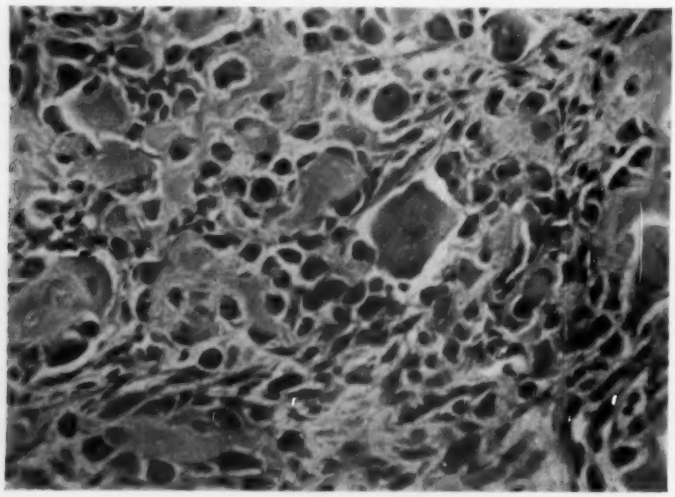

Fig. 6 (Case 3).—Microphotograph of tissue removed at operation.

Fig. 7 (Case 3).—X-ray showing erosion and decalcification of the roof of the right orbit.

Dr. A. Eggston reported that the section removed showed numerous areas and strands of osteoid tissue, some bony tissue, numerous osteoclasts, some osteoblasts, and osteoclastic giant cells. There was a stroma consisting of fibroblastic cells. The impression was that of a somewhat pleomorphic benign giant-cell tumor of bone.

In May, 1952, a course of radiation was given. Reexamination in June, 1952, revealed vision of 20/100 on the right and 20/30 on the left. The eye was still proptosed. X-rays taken in October, 1952, revealed calcified healing of the area of lesion of the orbital roof. It is not possible to reexamine this patient now, 20 months after surgery, but I have been informed that she is well and that the eye is still proptosed.

SUMMARY

1. A brief review of the literature on benign giant-cell tumors is presented, including history, incidence, etiology, and treatment. This review of the literature demonstrates the paucity of cases of benign giant-cell tumor involving the nasal sinuses and skull.

2. Three cases are presented of benign giant-cell tumor involving (*a*) the maxillary sinus, (*b*) the sphenoids and ethmoids, and (*c*) the roof of the orbit.

3. One case was treated by excision, a second by radiotherapy, and the third by both excision and radiotherapy. The case in which complete excision was feasible is the one which has had the best clinical result.

Dr. A. Eggston, Manhattan Eye, Ear and Throat Hospital, permitted publication of a case in this report.

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Case Reports

OSTEOMYELITIS OF THE ASCENDING RAMUS OF THE MANDIBLE SECONDARY TO A PERITONSILLAR ABSCESS

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WE ARE presenting this case of osteomyelitis of the mandible secondary to a peritonsillar abscess as an example of an infrequent but important complication of otolaryngologic disease.

REPORT OF A CASE

A. S., a 43-year-old Negro man, was admitted to the University Hospital on June 10, 1953. He had been well until 10 days prior to his admission, at which time he noted slight soreness of his throat, felt slightly febrile, and had malaise. Three days later, failing to feel any improvement, he consulted his family physician. The patient was told that there was something wrong with his throat and was given an injection of penicillin as well as some mouth wash. These failed to relieve his symptoms, and the family physician then referred him to the University Hospital.

At the time of admission, the patient's temperature was 99.4 F. Positive physical findings were limited to the throat. He had marked trismus. The anterior pillar and soft palate on the right were noticeably swollen, and the uvula was displaced to the left. The swelling was firm and tender. Cervical adenopathy was present. No evidence of active dental pathology was noted.

The patient was given 600,000 units of crystalline procaine penicillin G (Crysticillin) b.i.d. and frequent gargles with warm compound borate (Dobell's) solution. Shortly after admission, the swelling ruptured spontaneously and drained a purulent material. Drainage was enhanced by spreading the wound. The right side of the face became swollen during the evening of admission. The temperature remained between 99 and 100 F. The wound continued to drain for several days in diminishing quantity, and the swelling of the face gradually subsided. At no time was the mandible noted to be tender. Routine urine examination revealed a 3+ reaction for sugar, but a fasting blood sugar was 110 mg. per 100 cc.; the patient was considered to be mildly diabetic and was placed on a dietary regimen. He was discharged as well on the fourth day following admission.

The patient was not seen again until Aug. 8, 1953 (two months later), when he visited the clinic. During the interim he noted swelling at the angle of the right jaw. This, he felt, had varied in size and at the time of his clinic visit was the smallest it had been. Swelling was also noted over the parotid and mandibular area. This had been rather tender, but the patient stated that the tenderness, too, had largely subsided. There was some tenderness present at time of examination, however. There was also a moderate degree of trismus. Examination of the throat, fauces, and oral cavity revealed no pathology. He reported a weight loss of 20 lb. (9 kg.) over the past few months and noted polyuria and polydipsia. He was admitted to the University Hospital the following day. In addition to the local findings described, he was found to have a 4+ reaction for sugar in the urine and a fasting blood sugar of 210 mg. per 100 cc. He was started on 20 units of NPH insulin. An x-ray of the mandible was reported as follows:

"There is considerable irregularity of the cortex of the ascending ramus of the right mandible as seen in the A-P projection. The lateral view shows a punched-out defect, in the center of

From the Departments of Otolaryngology and Oral Surgery of the Hospital of the University of Pennsylvania.

which is a small osseous body suggesting a sequestrum. Marked soft tissue swelling is also noted in the area. The left temporomandibular joint is normal in appearance while there is evidence of effusion of the right. Roentgen diagnosis: Probable osteomyelitis in the right mandible."

The patient was afebrile. Thorough examination confirmed our belief that there was no odontogenic focus present, and we concluded that the tonsillar infection was the primary site of infection. The administration of penicillin G, 600,000 units b.i.d., and streptomycin, 0.5 gm. b.i.d., was begun. After assurance that the diabetes was controlled, the patient was operated upon on Aug. 11, 1953. Under general anesthesia the area was explored, and an osteomyelitic lesion through the inner and outer plates of the ascending ramus of the mandible was found with a sequestrum in the middle of the area. The lesion was about 2 cm. in diameter. No frank pus was present. A drain was left in place for 24 hours. After removal of the drain, the wound healed readily. The patient remained afebrile, and he was discharged on the fourth postoperative day.

Microscopic examination of the tissue which was removed was reported as granulation tissue and bone. Unfortunately, material sent for bacteriologic study was lost.

Lateral view of the mandible showing the defect with a sequestrum in its center.

After his discharge, the patient continued to have some mild tenderness over the operative site for about a month and a half. He then became completely asymptomatic. He was last examined on Nov. 28. He was free of all symptoms; his jaw moved freely and was nontender, and no facial asymmetry was evident. His throat was free of disease. His diabetes was well under control with 20 units of NPH insulin daily.

X-ray of the mandible continued to show a bony defect with a suggestion of osteogenesis, but no evidence of an active infectious or destructive process was present. For the time being, we may consider the patient as cured.

We are presenting this case (1) because of the infrequency of spread of tonsillar disease to the mandible, (2) to present another example of apparently adequate dosage of antibiotics masking the presence of low-grade infection, and (3) to give consideration to the possible avenues of spread.

A review of the literature produced only three similar case reports in recent years. Hochfilzer,[2] in 1930, and Hayden,[1] in 1933, reported cases of cervical phlegmon with osteomyelitis of the jaw following local tonsillectomy. In 1931,

Blair, Brown, and Moore [3] reported a case of osteomyelitis of the jaw following tonsillitis. Standard textbooks of oral pathology give passing reference to this entity, but actual case reports are apparently limited to those just mentioned. It would seem, however, that such a lesion would be commoner than is indicated by the number of case reports in the literature.

It would seem that the most likely avenue of spread of infection in the case we have reported was a direct one via a rupture through the superior constrictor muscle to the internal plate of the mandible. The presence of hitherto unrealized diabetes no doubt played a conspicuous role in the patient's general predisposition to the spread of infectious processes. Whether or not earlier detection of the diabetes would have prevented this is now only a philosophic point. Of interest also is the fact that this patient developed the osteomyelitic lesion after a course of penicillin therapy, which was adequate enough to eradicate his primary disease entity.

Other avenues of spread which seem less likely to play a role in this case are hematogenous and lymphatic. The latter does not give an adequate anatomic explanation. If the spread were hematogenous, one would expect the lesion to be more diffuse rather than a single lesion. Batson * suggests a retrograde venous spread of the infectious process. However, the actual mechanism whereby the mandible becomes involved secondary to pyogenic infections elsewhere is not clear. In the majority of instances, contiguity is probably the prime factor, but the possibility of a hematogenous route cannot be eliminated in this case.

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* Batson, O. V.: Personal communication to the authors.

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Clinical Notes, New Instruments and Techniques

AUDITORY MALINGERING AND PSYCHOGENIC DEAFNESS

Comments on a New Test and Some Case Reports

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AND
WILLIAM R. TIFFANY, Ph.D.
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The literature on hearing testing is replete, not to say overburdened, with tests for nonorganic hearing loss, usually labeled "malingering tests." We have found over 40 such tests in the literature, including the well-known Stenger, Lombard, and Doerfler-Stewart as well as the less well-known Hummel, Dolger, Becker, and Tschudi tests. Successive authors have pointed to the many more clinical signs, not dignified by the name "test" but nevertheless indicating the possibility of faked deafness in the patient who complains of hearing loss. Among such signs are included the unreliability of repeated audiograms, inconsistencies in speech and hearing responses, presence of conditioned responses, and many others. There would seem to be little point in discussing a new "malingering test" in these pages unless it can be shown that the need for better diagnostic measures in this realm still exists.

Unfortunately, the need for more reliable examination procedures does exist for nonorganic hearing loss. This need results from three basic limitations of present tests: lack of reliability, dependence upon patient naïveté, and necessity for "expert" interpretation.

The first limitation of present tests for malingering or psychogenic deafness is that they are truly consistent only in the case of the unilateral malingerer—a type of relatively infrequent occurrence. Here the Stenger test and tests based upon this principle seem almost infallible in the hands of an expert. The case for the bilateral malingerer is quite different.

The second limitation is based on the fact that many malingering tests for bilateral loss depend for their success upon the naïveté or lack of wit and skill in the patient. That such wit varies from patient to patient is a fact of human behavior with the status of an axiom. Even in such a task as repeating a simulated audiometric curve, Luscher [1] points out that there are people who can produce a once-simulated curve at will, even though poor intensity memory makes this impossible for most. Many of the clinical signs and test results relied upon for a malingering diagnosis are fallible, with responses often transient and nonrepeatable. It is no wonder that the doctor is often unwilling to brand a man a fake or psychotic on the basis of the presence of an eyeblink, the fact that "the speech is too good," that "he hears sometimes and not at others," or that "I don't believe that he can read lips as well as that."

The third limitation is concerned with the fact that too many tests are subject to expert interpretation only. The seriousness of this objection is pointed up by Firestone,[2] who notes that "the use of the term malingering . . . places the otologist in the position of having made a very positive statement, not only as to the state of the . . . auditory condition, but also as to his honesty and character, and throws the onus of proof on the otologist rather than on the individual feigning deafness, to whom it rightly belongs. . . . If the otologist is unsuccessful in making his tests intelligible to the jury, the claimant gets the award regardless of the merits of his claim."*

From the Department of Speech, University of Washington.

* Reference 2, pp. 405 and 406.

The more reliable and better rationalized of the tests of "nonorganic" hearing loss tend to be specialized, expensive, time-consuming, and not "intelligible to the jury." Narcosynthesis, electroencephalography, and psychogalvanic skin-resistance audiometry, although successful in a high percentage of cases, are not readily demonstrable to the layman.

What seems to be required of a successful test of "simulation deafness" or psychogenic deafness is that it be simple of administration, capable of interpretation by a reasonably intelligent layman, and productive of reliable, repeatable results. In particular, it should have good positive reliability, i. e., no nonmalingerers should fail the test even though some malingerers should "pass." Finally, it is desirable, although perhaps not absolutely essential, that the test result in some reasonable approximation of the "true threshold." This would seem particularly essential in the case of partial psychogenic overlay.

Since 1950 we have been experimenting with a type of test which seems to fulfill these criteria, at least in a moderate way. We have been developing a test for malingering and/or psychogenic deafness suitable for the bilateral malingerer or psychogenic case on all of the above counts. This test involves the use of what is known as the delayed side-tone phenomenon, first described by Lee.[3]

The delayed side-tone test for malingering has the advantage of appearing not to be a hearing test at all. The subject is merely asked to read a simple prose passage or to perform some other simple oral task while he wears a pair of earphones. As he reads, his voice is recorded and then, with about a 0.2 second delay, is fed back at a controlled intensity level to the subject's earphones. An immediate and profound change is observed in the speech of the hearing subject—a change which the subject seems quite unable to control. His enunciation is slurred, he stutters, changes occur in voice quality, pitch control is lost, intensity is increased, and the speech is markedly slowed.

In studying this delayed speech phenomenon, we, in addition to others, have noted that the effect is critical with respect to amount of delay (0.18 second appears to be an optimum delay in the average case) and the intensity of the delayed signal. The effect seems to "take hold" reliably at from 20 to 40 db. above threshold. The speech distortion also appears to vary with the type of speech or other spoken, sung, or whistled signal. It would appear that that speech is hardest to control under feedback, which demands the most careful control over rhythm of pitch and intensity changes. Whistling seems an ideal testing activity, probably not only because of the definite rhythm and pitch control required but also because bone-conducted sound is minimal compared with voiced speech. In every case tested so far normal whistling has not been even reasonably approximated by a hearing subject under conditions of delayed side tone. Finally, there are individual differences in response to the disturbing effect of the side tone which are, as yet, unexplained. However, exploratory studies have failed to identify speaking ability or intelligence as closely related.

Despite the fact that people vary in the degree to which they respond to delayed side tone, the important fact is that, to date, no one with normal hearing acuity has been able to "beat" the test when whistling is included in the measures taken. This is true even though the subject is aware of the test purpose and method. In the majority of cases even prolonged practice is of little help. As long as he hears the tone at from 20 to 40 db. above his threshold, his speech will be affected. Furthermore, the effect on the speech is ordinarily of such an obvious nature that even the most naive or skeptical of listeners cannot fail to detect it instantly. The reliability seems to be especially high and the value of training and prior knowledge particularly low in the case of timed, rhythmical speech and whistling.

Thus far, studies of the delayed side-tone phenomenon as a nonorganic hearing test have employed normal-hearing subjects who were carefully instructed to feign deafness. The relative scarcity of auditory malingerers has precluded their use as experimental subjects. Despite this fact, it is possible at this time to report the results on five questionable and one "classic" case of malingering or psychogenic deafness.

In one case of suspected psychogenic deafness an 11-year-old girl was revealed in initial audiometric studies to have a loss for pure tones of between 75 and 85 db. bilaterally. Because the response for speech was seemingly inconsistent with her complaint and because a case history

revealed the possibility of severe emotional trauma, a psychogenic etiology was suspected. While the child read from a picture story book, 50 db. of delayed feedback was administered. The change in reading pattern was immediate and marked. The intensity level of the feedback was reduced in this case to within 10 or 15 db. of normal threshold before the speech interruption was lost. It was concluded that hearing for speech in this case was essentially normal.

In one year four additional cases were presented to us at the Speech and Hearing Clinic of the University of Washington. These included two adolescent girls who were "feigning" (?) moderate to severe bilateral hearing losses but who showed marked speech breakdown at about 30 db. of delayed feedback and two veterans referred for hearing aids. One of these veterans came to the clinic wearing his aid turned to full volume and showed no measurable pure-tone response. He evidenced marked speech breakdown at about 40 db. of feedback. His loss was tentatively diagnosed as psychogenic, and he was referred for treatment through proper channels. The second veteran showed a 95 db. average loss for pure tones but possible response to delayed feedback at 50 db. and probable response at 60 db. He, too, was referred through proper channels for medical reappraisal.

Recently we had referred to us a case which had all the characteristics of a classic case of what could be termed "insured disability malingering." An insurance claim for a substantial amount of money had been withheld in this case, as various specialists were unable to agree upon the results of their examinations. When we were called in to perform whatever tests seemed necessary, we were understandably grateful, as this gave us an opportunity to work with a bona fide suspected malingerer, a type of hearing case for which the test was developed and the one type that had not yet been encountered in any sort of classic simplicity.

In 1952, the patient, Mr. H. M., employed as a laboror, was engaged in unloading a truck. Another worker who was holding a hand truck allowed it to slip and hit H. M. on the ear. He complained immediately of an extreme loss of hearing and was taken to the company doctor. The doctor's report of examination shows: "An audiogram was taken on this case . . . and showed an average loss of 50 db. in his right ear and 70 db. loss in his left ear to air conduction. X-rays show no evidence of fracture, and I have a suspicion that there is a hysterical factor in this case."

Inasmuch as this accident occurred on company time and property and pursuant to company business, H. M. filed a claim for loss of hearing. Because of the tenor of the original medical report, it was deemed advisable, a few months following the accident, to request a second examination by an ear specialist. This specialist, apparently not wishing to judge the veracity of the claimant, simply reported a combined loss of hearing of 95.5%. "Ear, nose, and throat examination is negative. Tympani are normal in appearance." On the basis of his findings he suggested the possibility of ". . . a concussion which led to eighth-nerve deafness."

Subsequent to these examinations a number of reports were collected from H. M.'s co-workers regarding his hearing status. These reports were completely contradictory. Some stated that they had spoken to H. M. and that, although he was unable to see the speaker's lips, he made the appropriate reply. Other statements indicated that H. M. was completely unable to carry on a conversation unless he could see the speaker's mouth.

As a result of this conflicting evidence a commission of specialists (five otolaryngologists) was appointed to determine, if possible, the nature of H. M.'s hearing loss. Because of the division in opinion among the members of this commission the claim remained unsettled.

Running throughout most of the examination reports of the commission was the comment concerning H. M.'s remarkable lipreading ability. H. M. explained this by saying that lipreading had been his hobby since childhood. As one of the commission doctors commented, "A most unusual hobby." This lipreading was H. M.'s excuse when someone questioned his apparently normal understanding of even the most complex conversations. A line of investigation which was not undertaken by the various specialists was a test of this lipreading ability. If H. M. was found to be a poor lipreader, this alone would have discredited his story of hearing loss.

In 1953 H. M. was referred to us for further evaluation. Below is an abstract taken from the filed report of the case:

1. Response to pure-tone audiometry: 70 to 100 db. loss in left ear from 125 to 1000 cps; no response above this point; response in right ear at 1000 cps only at 100 db. above threshold. Reliability of immediate test-retest measures fair.

Two relevant notes at this point: 1. Previous audiograms not consistent with one another and not consistent with this more recent audiogram. Difficulty in reproduction of threshold curve is a common indicator of hearing loss of nonorganic origin. 2. Patient reports that he feels his better ear to be the right ear (the side opposite the blow on the ear), while audiogram shows left ear to be better.

2. Speech audiometric test results are inconsistent. Obtained responses to spondaic words only sporadically at 90 db. There was no apparent startle reaction or report of pain from this patient at levels which usually produce such responses in the organically deaf.

3. Responses to environmental sounds are inconsistent with the audiometric results. The most noted incident of this kind occurred in a conversation which had been previously structured to trick him. While one of the two clinicians maintained him in conversation, the other, whose face was hidden, put questions to the patient in a voice approaching the intensity of a loud whisper. To many of these questions the patient gave the appropriate response.

4. Speech is normal in every way with no voice or speech defects and no increase in loudness. The most obvious alteration in voice and speech in hearing losses of the magnitude claimed would be (1) marked increase in vocal intensity in order to hear own voice and (2) a distortion and gradual loss in articulation ability for the high frequency fricative sounds (s, f, th, etc.). If anything, Mr. H. M.'s voice is slightly softer than normal. There is a complete lack of correspondence here with respect to nerve deafness.

5. Because this patient claims superior lipreading ability, an informal estimate was made of his facility in lipreading. Our conclusion is that his ability is no better than the average for a normal-hearing person. Of note in this test was the fact that some of the statements given Mr. H. M. to lipread were the following: "What is your name?" "Where do you live?" "How old are you?" etc. To these questions (spoken in a whisper, with the patient in a soundproofed room and the tester in another room connected only by a special viewing window) the patient could make no correct responses. However, the examiner then entered the room and, with the pretext of filling out a necessary form on the patient, asked the same questions. The patient was able to "lipread" all of the questions, even though, at times, the examiner's face was not visible to the patient.

The above results themselves would seem to abolish all doubt as to the integrity of the peripheral hearing mechanism. However, because a validating and more demonstrable test was desired, the delayed side-tone test was used. The subject was requested to read a simple 15-second prose passage of approximately the reading level of an 8-year-old child. After he had read it once, he was asked to continue to read it again and again until requested to stop—and to read it in the same way each time. The first five readings were allowed to go by without interruption while an average reading rate was found. Then delayed feedback was given at successively higher levels from 20 to 80 db. over the next five readings. After this the subject was asked to whistle "Yankee Doodle" two or three times and was also asked to count rapidly from 1 to 10 several times.

The results of the above test made it abundantly clear that the subject's speech was being markedly affected by the test conditions. Reading began to slow at the 40-db. level and at the 60-db. level showed typical marked symptoms of breakdown. Words were repeated or "stuttered," there was a marked slowing of rate, and intensity was raised. Whistling was even more markedly disturbed.

From the above tests it was concluded that a true hearing loss of not more than 40 db. could be predicted. If the total test picture and the possible motivation of the subject are considered, the results should not be thought of as precluding the possibility of normal hearing.

At this point it should be emphasized that although failure on the delayed side-tone test probably established the integrity of the peripheral auditory mechanism, it does not necessarily establish malingering as a diagnosis. Even in cases of this type, in which the motivation for malingering seems fairly clear-cut, it is probably wise to seek competent psychiatric council, not only for aid in interpreting the meaning of the examination findings to a possibly disturbed

or psychotic person but also to aid in establishing a differential diagnosis between malingering and hysteria and to help the patient who well may be a disturbed person with need for psychiatric council regardless of which diagnosis is rendered.

In conclusion, it may be suggested that the phenomenon of speech breakdown may have other applications and implications, both clinical and theoretical. In the University Speech and Hearing Clinic the device has been used in a positive fashion graphically to demonstrate to mothers and relatives the real presence of organic hearing loss. The implications with respect to the importance of self-speech monitoring by a speaker, the individual differences in resistance to distortion, etc., remain to be investigated.

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NEW NASOPHARYNGEAL PUNCH FORCEPS

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The surgical removal of lymphoid tissue in the nasopharynx in areas inaccessible to the smaller adenotome has made necessary the use of punch forceps. These instruments have an important place in the surgery of adenoidectomy, particularly in patients with hearing defects.

The purpose of this article is to describe an instrument * which I find useful in this procedure. This instrument is not intended to supplant the useful nasopharyngeal punches now in use, but, by virtue of its design, it is an operative aid. The punch has a curved shaft, and this makes for ready access to areas high in the nasopharynx. Lymphoid tissue collections found in the choana during adenoidectomy are easily removed by using the finger as a guide. With proper lighting

Nasopharyngeal punch forceps.

and exposure by palatal retraction, lateral pharyngeal collections of lymphoid tissue are conveniently removed. Hypertrophic lymphoid tissue in the area of Rosenmüller's fossa can be selectively removed by the punch guided by the finger of the nonoperating hand. The instrument has also been useful in taking biopsy specimens of lesions in the nasopharynx in adults.

SUMMARY

A nasopharyngeal punch forceps is described.

It has been found satisfactory for the purpose of its design, an accessory instrument in surgery of the nasopharynx.

2106 Spruce St. (3).

* Manufactured by George P. Pilling & Son, Co., Philadelphia.

Progress in Otolaryngology

Summaries of the Bibliographic Material Available in the Field of Otolaryngology for 1952

THE PARANASAL SINUSES

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ANATOMY, PHYSIOLOGY, PATHOLOGY, DIAGNOSIS

RICHTER [1] studied serial sections of the nose in 12 embryos from the second month on and 25 autopsy specimens from early childhood, for the purpose of determining the rate of development and distribution of the mucous glands. In general he found that the glands developed pari passu with the mucous membrane as it grew from without inward to line the newly forming cavities. Thus, in the very young fetus the glands are first seen low down in the vestibule, and as the epithelial carpet spreads inward and upward, glands develop in the same direction. For instance, in the middle of the fourth fetal month he found budding glands in three locations, namely, the middle meatus, on the septum just above the recess of Jacobson's organ, and in the vestibule just beyond the mucocutaneous junction. Since the sphenoid sinus appears early, he found evidence of developing mucous glands in a six months' fetus, whereas in the case of the ethmoids, which appear later, the glands were not seen until the seventh month. In the respiratory region the glands appear earlier than in the sinuses.

As to the distribution of the glands, it was found that they were more numerous in the lower anterior portions of the nasal chambers than in the posterior superior areas.

It was also noted that the glands were more numerous in areas that were rich in mesenchymal tissue than in the thinner epithelial tissues, such as are seen lining the ethmoid cells.

The article is illustrated by a number of sections from the specimens that were studied.

Kinley and Leighninger [2] present an unusual case of nasal hemorrhage following a severe head injury with extensive compound comminuted fracture of the frontal bone and laceration of the dura. The bleeding was traced to the sphenoid region, and, following primary wound care and fixation of the facial bone fractures, angiograms were taken, which showed an aneurysm anterior to and just below the pituitary fossa, which seemed to be connected with the internal carotid artery. However, an oblique projection revealed the aneurysm arising from the ophthalmic artery.

After a primary 15-minute occlusion of the internal carotid artery, it was permanently ligated 2 cm. distal to the bifurcation. Two weeks later a right osteoplastic flap was reflected and two silver clips placed across the internal carotid artery where it emerged from the cavernous sinus. The ophthalmic artery was not visualized. At a later date a tantalum plate was implanted to correct the cranial deformity. The patient recovered, although the initial blindness became permanent, with atrophy of the optic nerve.

Festimanni [3] describes the frontal emissary vein, which may be seen in some x-ray pictures taking a course upward, inward, and backward, affording a communication between the veins of the pericranium and the dural sinuses. Specifically, it connects the superficial veins of the orbit with the superior sagittal sinus. Several very interesting x-ray pictures are shown, illustrating different varieties of the emissary. The presence or absence of valves in the vein cannot be definitely determined. It is interesting to note that the vein does not appear to have any collaterals and does not anastomose with the diploetic venous system. Also, it appears to be present mostly in cases in which the frontal sinus is not fully developed or very extensive.

Borghesan [4] discusses the role of a pneumatized crista galli in the pathogenesis of hyperergic frontobasilar inflammation. In some cases it is associated with a hypoplasia of the frontal sinuses and retarded closure of the sutures. Several x-ray pictures are shown, which illustrate these abnormalities.

A report from Spain [5] quotes Professor Maranon and Dr. Galvez, who compared the clinical findings with the radiological findings in a series of 8,000 radiographs of the skull, including those of healthy persons as well as a number with headaches, neuroses, and psychoses. They demonstrated a parallel between the development and functional capacity of the pituitary gland with the development of the sinuses. The size of the frontal sinuses is exactly in proportion to the degree of hyperpituitarism. The sphenoid sinus is affected likewise, although to a lesser degree. Nevertheless, in cases of hypopituitarism the degree of the hypophysial-hypothalamic insufficiency was reflected in the comparatively late development of the sphenoids.

Šercer [6] studied the influence of nasal respiration on the bronchial musculature by means of small balloons introduced into the bronchial tubes, whereby their excursions could be accurately measured. He found that mouth breathing reduced the activity of the bronchial tubes to such a degree as to impair pulmonary ventilation. This, in turn, led to a disturbance of the alkali reserve of the blood. Šercer's observations confirm those of other authors, proving that nasal reflexes induced by the currents of air have a profound influence on the musculature of the bronchi, which is so arranged in a spiral fashion as to permit expansion and contraction of the tubes both vertically and horizontally.

There is a normal physiologic alternating variation in the lumina of the two nasal chambers. While the mucosa of one side is swelling, thereby affording warmth for the inhaled air, the other side is contracting and throwing off secretion to moisten the air. The average normal monometric pressure has been determined to be 4 mm. H_2O per second. Stoksted [7] made studies of pressure variations in 10 subjects, the cycles being observed under the same conditions of room temperature and humidity. Several graphs are shown which demonstrate the variations in normal persons as compared with abnormal readings obtained in persons with nasal pathology.

Brunner [8] cites several cases of fibrous dysplasia of facial bones causing obliteration of the maxillary, frontal, and ethmoid sinuses, either alone or in combination. One case was in a child of 7 years, in which a marked widening of the nasal bridge and displacement of the bulb were due to a bony mass occupying the ethmoid and frontal sinus areas and extending into the nasal bones and frontal process. The author believes that in this case the sinuses never had a chance to develop, because

of the early growth of the mass. In the cases occurring in adults, it is likely that the preformed sinus cavities were obliterated by the invasion of new bone. Histologic examination of tissue removed reveals a cancellous type of bone with numerous trabeculae and a myelofibrosis rich in blood vessels. It is difficult to say whether the pathology described is any different than an osteitis fibrosa or ossifying fibroma in the later stages. The growth is of the invasive type, without any marked delimitation, develops slowly (causing external deformity), and has a tendency to continue developing if incompletely removed.

DeBarros, Lima, and Correa [9] present the x-ray and histologic findings in five cases of leishmaniosis of the nose and nasopharynx, in which the sinuses were also involved. The lesions of the nose in all the cases were far more extensive than those of the sinuses. X-rays showed hyperplasia of the antrum mucosa and condensing osteitis of the bony walls. Tissues removed during the Caldwell-Luc procedures showed intense inflammatory reaction in the mucosa with nodular infiltration by masses of histiocytes, plasma cells, and an occasional giant cell.

In a lengthy article constituting the first chapter of a series of articles which is to appear in the "Manual of Applied Pathology of the Ear, Nose, and Throat for the Home Study Course," Dr. Semenov [10] reviews the anatomy and pathology of the sinus mucosa as manifested in various pathologic states. Much of the material presented reflects the experience of the author in finding the allergic factor as a common basis for the development of the condition.

Cortisone was tried in some cases, but the results were not satisfactory. Locally it is without effect, and when given parenterally it is not without danger.

Lucas [11] contributes a very interesting paper on the histopathology of various types of sinusitis. The illustrations are remarkably clear and very instructive. These include sections showing reticuloendothelial proliferation around a capillary vessel, masses of plasma cells in an allergic polyp case, mucosa of an infected sinus with polymorphonuclear leucocytes, histiocytes, and fibrocytes, an aberrant lymph follicle in a chronic infective case, and the widespread infiltration of lymphocytes and plasma cells in a case of nonsuppurative sinusitis.

These various types of sinusitis are discussed from both the clinical and the histopathologic point of view.

Majer's [12] histologic studies of excised nasal polypi in 335 cases, 62 of which were associated with asthma and 85 showing clinical evidence of a chronic allergic state, demonstrated definite neurovascular changes, tending to prove that these states were due to disturbances in the neurovascular apparatus. He found by means of various silver stains a large number of epithelioid cells and vacuoles in the walls of the blood vessels. Since these changes were present only in the allergic cases, the evidence would appear to support the contention of Williams and others that the basic cause of allergic disease is a disturbance in the autonomic nervous system.

Taillens [13] discusses the value of eosinophilia in the tissues and in the blood as a bearing on indications for surgery in nasal polyposis. He seems to attach greater importance to the presence of eosinophiles in the blood than in the tissues. Consequently, a high eosinophile count in the blood is likely to portend unfavorable results from surgery.

Analysis of 82 cases operated upon more or less radically revealed the almost constant involvement of the antrums in these polyp cases: the anterior ethmoids

in less than 10%, the posterior ethmoids in 40%, the frontals in 13%, and the sphenoids in 6%. This explains the preponderance of polypi in the middle meatus as compared with the superior meatus.

As to surgery in polyp cases, the author argues that, aside from specific therapy directed at the offending allergens in some cases, it is not enough to remove merely the polyps, because secondary infection in the sinuses will predispose to recurrence. He attempts to refute the arguments of allergists who claim that extensive surgery is contraindicated by arguing that recurrence of polypi is due to incomplete ablation of the ethmoids and failure to remove the infection, which usually has supervened, and that the newer medical therapeutics serve only to temporarily halt the process without curing it. In 82 cases subjected to radical surgery, there were only five failures, which the author discusses at length.

Drymael [14] points out an error in diagnosis which may arise when conventional lateral views are taken of the antrum, particularly if filled with a diagnostic radiopaque solution. Even with complete filling, one will find a defect in the anterior angle of the sinus, which could be mistaken for thickened mucosa; but which, in fact, is due to the obliquity of the anterior sinus wall from the point where it diverges from the internal wall. To avoid this misinterpretation, he suggests turning the head so that the principal ray will line up with the plane of the anterior wall rather than striking it tangentially. This procedure will also make it easier to read the two antrums, because they are thus placed above each other rather than superimposed.

Vinson [15] describes the method employed at the United States Hospital, Fort Knox, Ky., for taking routine sinus pictures. Four views are taken on a single 14 by 17 in. (36 by 43 cm.) film. They are taken with the patient in the upright position, using the Bucky technique, 82 kv., 60 ma., and 30 in. (76 cm.) between target and film. Time of exposure is as follows: (1) frontal sinus, 1 second; (2) open mouth, 1.5 seconds; (3) maxillary, 1.75 seconds; (4) lateral, 0.4 second. The advantages cited are that this method reduces film cost, eliminates time for the technician to remove and replace cassettes, and saves the clerk's time as well as the surgeon's reading time.

Ghislanzoni,[16] in a beautifully illustrated article, demonstrates graphically the value of planography in the diagnosis of lesions of the maxillary sinus. By following the conventional film with laminographs at various levels, he shows how an obscure shadow can be clarified. This is particularly valuable in cases of early malignancy. In the several cases shown, he points out local absorption of one of the bony walls, areas of necrosis, small sequestra, etc., which could not be seen in the conventional film. There is much to be derived from this procedure, and it is unfortunate that in this country it is less frequently employed than abroad.

Auer [17] shows how an error in diagnosis of sinus pathology may be due to faulty placing of the head in the half-axial projection. When the head is tilted slightly to one side, the lateral mass of the axis is projected into the sinus area, causing a shadow, which can be mistaken for pathology. Also contributing to this false picture is the fact that the medial wall of the antrum is thrown over the ethmoid shadow; also, the horizontal dimension of the sinus is shortened.

The author shows two pictures of the same head—one in which the head is accurately centered, the other with it tilted to one side—in which the appearance of the normal and the diseased sinus seems reversed.

Goldman [18] emphasizes the value of bacteriologic and serologic examinations of nasal and sinus secretions in the differential diagnosis of allergic and bacterial affections. Knowledge of the infective agent is the best guide for proper therapy, particularly in view of the selectivity of some of the antibiotics for certain types of bacteria. Methods of obtaining specimens, staining procedures, and interpretation of the results are touched upon, and a few illustrative cases are cited.

Agazzi [19] uses the Broyles nasopharyngoscope for direct antroscopy via a trocar opening in the inferior meatus. He finds that it is a valuable aid in diagnosis, and his article shows a number of colored slides depicting various pathologic conditions within the antrum as they appear through the nasopharyngoscope. The procedure is particularly valuable in the diagnosis of antral tumors.

INTRACRANIAL COMPLICATIONS

DeSanson, Kós, and Hungria,[20] in reviewing the intracranial complications that may arise from frontal sinus infections, call attention to the relative infrequency of thrombosis of the major venous channels as compared with infections of otitic origin. Otherwise, the article is concerned mainly with a classic description of epidural abscess, subdural abscess, meningitis, and brain abscess, with the usual discussion of the routes by which the infection is transmitted.

Ten interesting cases of meningitis due to a focus of infection in the sinuses are reported by Duclos and Corcuerra.[21] They direct attention to the comparative absence of clinical signs of sinusitis in most of these cases, which leads them to suspect that frequently such foci are missed. They emphasize the importance and value of careful x-ray studies as well as exploratory puncture and irrigation. Proof of the etiologic significance of such foci was found in six of the seven cases examined histologically, all showing chronic sinusitis.

As to therapy, the authors advise adequate sinus surgery as soon as the focus is diagnosed.

Pitts [22] discusses subdural abscess complicating frontal sinusitis in a very comprehensive manner, reporting four cases, in three of which the patients survived. Sudden onset of Jacksonian seizures and other focal signs point strongly to this complication. The abscess is limited at the start but may spread over the entire hemisphere and even to the opposite side if unchecked. Treatment consists of large doses of antibiotics, drainage of the subdural accumulation through burr openings, and instillation locally of penicillin solutions. At the same time the sinus must be cleaned out, and if osteomyelitis is present extensive resection of bone may be required.

Undesirable sequelae observed in several cases were Jacksonian seizures, due to inflammatory products and cicatrization over the motor areas. The author believes that the local instillation of penicillin may have had something to do with this phenomenon and suggests future clarification on this point.

Bozzi and Quarti [23] report a case of subdural abscess in a man aged 32 complicating a chronic hyperplastic frontal sinusitis. There was a history of unilateral nasal obstruction over a period of years. In recent months the patient complained of a severe frontal headache with intermittent fever, which brought him to the clinic. Also, he was a diabetic. Examination revealed polypi, a slight amount of mucopurulent discharge, and marked clouding of all the sinuses on the affected side. He was put on insulin and penicillin, and the ethmoids and sphenoid were opened and

drained. On the third postoperative day he became stuporous and displayed neurologic signs of cerebral irritation, facial paresis, Jacksonian seizures, and a contralateral pyramidal syndrome. A craniotomy was performed and an extensive subdural abscess uncovered in the frontoparietal area. Drains were inserted, and daily lavages with penicillin were carried out. The process gradually subsided in the course of the next 10 days, and the patient recovered.

Since there was no evidence of osteomyelitis, the authors conclude that the infection was transmitted via connecting veins.

(Reviewer's Comment: It seems rather strange that the possibility of an etiologic connection between the recent ethmoidectomy and the intracranial extension was not considered.)

Rüttimann [24] describes a pathologic entity called "perisinusitis" after quoting liberally from several Italian authors who have previously discussed this problem. According to them, a chronic sinusitis may invade the bony walls of the sinus, causing changes demonstrable on x-ray pictures and transmitting infection to the cranial cavity. The bony changes noted are diffuse thickening, osteosclerosis, and dilatation of the diploic veins. Some of these are shown in several x-ray pictures of frontal sinuses in cases cited by the author. Intracranially the process may cause thickening of the dural attachments around the hypophysis and throughout the base.

There is no characteristic syndrome denoting this condition, but a variety of symptoms have been noted. Headache, lethargy, and signs of pituitary disturbances as well as mental and psychiatric disorders have been described by various authors.

In a series of 79 cases of chronic frontal sinusitis, the author found 15 in which the x-ray pictures showed bony changes in the posterior wall. These resembled the hyperostosis of dysmetabolic origin without the quantitative extension. Most of the patients were middle-aged, and headache was prominent in 50% of the cases.

After discussing the symptoms and diagnosis of brain abscess, Shuster [25] considers the surgical approach. He believes that the otologist or rhinologist is better qualified to deal with the lesion than the neurosurgeon. His reason is that the former, having watched the progress of the case from its inception, is in a better position to localize the lesion. The approach of the rhinologist is through an already infected area, in many cases well walled off, and the abscess is more likely to be encountered in the near vicinity of the primary focus. On the other hand, the neurosurgeon approaches the abscess in the only way he knows how, which is through a predetermined clean area; if he locates the abscess, he must drain it through a previously uninfected area and in many cases at a greater distance than through the original focus.

As to methods of drainage, the author is convinced from his experience that a simple rubber tube left in situ for two to four weeks will yield a higher percentage of recoveries than any of the other procedures, such as glass tubing, wicker-basket types, or marsupialization.

Kahn [26] reports a case of spontaneous cerebrospinal rhinorrhea in a woman of 47, which was present for about two years. At times the amount of fluid lost was at the rate of 30 cc. per hour. There were intermittent bouts of fever up to 100 F., usually in the morning, and occasionally chills. The family history, habits, and past personal history were all negative, and there was no evidence of intracranial

tumor or a history of trauma. X-ray studies disclosed nothing unusual except four cyst-like shadows in the left ethmoid region. Two cubic centimeters of indigo carmine dye was injected at the fourth lumbar interspace, which appeared shortly after in the nasal discharge. Severe headache followed within 48 hours, the rhinorrhea having ceased 36 hours after the injection. A lumbar puncture was done and the fluid reported normal. Subsequently, following a second puncture, the rhinorrhea, which had reappeared for a few hours, disappeared again and had not recurred in more than a year.

The only explanation offered for the cessation of the discharge was the possibility of the dye having set up sufficient inflammatory reaction to seal off the meningeal defect.

A short addendum to the report states that less than two years later the rhinorrhea reappeared without antecedent infection, exertion, or trauma. Operative intervention had been considered at the time the patient had previously been hospitalized, but was decided against, since the discharge had ceased. There is no further mention of this action being reconsidered.

PULMONARY COMPLICATIONS

Okabayaski and Egashira [27] infected the sinuses of experimental animals (rabbits) with hemolytic streptococci and then studied the metastatic pulmonary changes which resulted. They found a pneumonitis characterized by mucoid or fibrinoid swelling of the septal walls. Active invasion by bacteria was not the rule, and the pneumonitis seemed to be characteristic of the rheumatic or allergic type. The lesions were the same as those seen in serum anaphylaxis or focal sensitization with foreign protein. Another finding that was noteworthy was the presence of peculiar granulomata resembling the Masson body.

In previous experiments cited by the authors, kidney and cardiac lesions resembling glomerulonephritis and rheumatic carditis in man were found after similar experiments on the same kind of animals.

Abendroth [28] calls attention to the term "sinusbronchitis," which he attributes to American writers, and which, he believes, should be more generally adopted. The association of a sinus infection with disease in the bronchopulmonary area is extremely common. He found in a series of 85 cases of bronchitis with emphysema that over three-fourths (83%) gave definite clinical evidence of sinus involvement, as proved by x-rays, irrigation, and surgery. Good results were obtained following proper therapy. Bacteriologic association between the two foci could not be fully established, because of the difficulty of obtaining uncontaminated specimens.

Dedichen [29] claims to have been one of the first to demonstrate the sinobronchial syndrome. He is convinced from his clinical experience that chronic bronchopulmonary infections are due to infections persisting in the upper respiratory tract, which will resolve only when the offending sinuses are properly treated.

He states that the physical examination will yield varying findings, depending on the time of day. Rales will be more abundant in the morning and may not be found at all in the afternoon. X-ray examinations may be negative except in cases of bronchiectasis or atelectasis.

The author calls attention also to the frequency of allergy as a complicating factor and the importance of tracking down and eliminating it.

OCULAR COMPLICATIONS

Savitt [30] reviews the various ocular lesions that may result from an adjacent sinus infection, pointing out the anatomic features that predispose to these complications. Closer relation between oculist and rhinologist is important in the early diagnosis and proper therapy of such cases.

Suster [31] observed five instances of cyst-like enlargement of the nasal sinuses. The etiologic factor was obliteration of the nasal lacrimal duct, the result of either chronic inflammation or trauma. The condition in three cases did not cause any particular difficulty, with the result that the patients did not pay any attention to it. In two patients the condition caused a serious orbital complication, namely, a periorbital abscess. A simple incision and drainage were not adequate. To avoid recurrence, it was necessary to create a wide communication with the oral cavity in addition to the radical operation on the involved sinus. Therefore the treatment was referred to a rhinolaryngologist.

D'Ajutolo and Pagliarani [32] report good results from displacement therapy in 15 cases of ocular diseases due to sinus disease. Treatments were given at 4- to 10-day intervals, using emulsions of naphthylmethylmidazoline nitrate and sulfomethylthiazole in deacidified olive oil. Four cases were cured, seven considerably improved, and three slightly improved.

SINUSITIS IN CHILDREN

Birrell [33] presents a very interesting discussion of chronic maxillary sinusitis in children, based on a study of 240 cases, in which 372 proof punctures were done. Secretion was obtained in 13.87%, and in only two cases was the diagnosis of chronic sinusitis considered positive. Since these findings are at variance with previously published statistics by other authors, Birrell questions the rationale of so designating the findings. He argues that chronic sinusitis in adults in most cases results from repeated acute attacks, which are extremely uncommon in childhood. At the Royal Hospital for Sick Children, in Edinburgh, Scotland, during a five-year period, when 10,000 new patients were examined, there was only one case of acute maxillary sinusitis. Secondly, if chronic sinusitis does exist as frequently as some observers believe, why does it never interfere with the development and pneumatization of the sinus, and why are the unerupted teeth never affected? Thirdly, if chronic sinusitis exists in such numbers as cited by many authors, why are more such cases not seen persisting into adult life? The conclusion must be that so-called chronic sinusitis in children is a self-limited disease, which is not consistent with the present concept of chronic infection.

In the author's opinion, one cannot make such a diagnosis on the basis of cloudy x-rays or the presence of bacteria in the aspirated solutions. The former may be due to transitory mucosal swelling caused by inadequate nasal ventilation, and bacteria on culture can be obtained from most mucous membranes without the implication of pathogenesis.

He believes that the solution of the problem is solely in nasal aeration, which means removal of tonsils and adenoids and the instruction of children in the proper manner of cleaning the nasal passages of secretion and proper nasal breathing. "No quantity of ephedrin and no multiplicity of wash-outs will ever clear the nose of a child who is afraid to use it for breathing."

Panzani [34] calls attention to the minor manifestations of asthma in childhood, in which a clear-cut diagnosis is not always possible, there being no reliable biological tests. He refers to nasosinal allergy, spasmodic cough, and allergic bronchial cough. To differentiate the purely allergic from the infectious cases, he has found the determination of the limits of pulmonary ventilation by means of the inhalation (aerosol) of acetylcholine to be of diagnostic value. It can be safely employed in children from the age of 6 years. In a series of 23 cases it was shown that when the M. V. C. (maximum vital capacity) was reduced 20% or more following the test, it was positive evidence that the condition was truly allergic. Also if the V. C. (vital capacity) was reduced 10% or more, the proof was even more conclusive. Naturally, the author recommends that other factors be considered, namely, the history, antecedents, and the eosinophile counts.

Brown [35] examined 100 ambulant rheumatic children at the New York Post-Graduate Hospital and found after 1,300 examinations (13 per patient) that every one had an active chronic sinusitis. As to why every child with sinusitis does not develop rheumatic fever, the author states that two factors may be conducive to this complication, namely, heredity, and pus under tension in the sinuses. He says that "without such tension, cervical adenitis does not develop and toxins of streptococci are not likely to invade the tissues." When the glands become involved, especially following a cold, one is likely to find that the sinus is tender to pressure. The author believes that the toxins of alpha hemolytic streptococci gaining access to the glands draining a sinus in which there is pus under tension soon find their way into the circulation and produce the rheumatic attack. It is important, therefore, that adequate drainage be established early in the disease and that prophylaxis against recurrences be instituted through the use of penicillin and vaccines.

He has found that an elevated antistreptolysin titer may be noted "just before and at the onset of the rheumatic fever and is presumptive evidence incriminating the hemolytic Streptococcus."

Schenck and Seldowitz [36] present sinobronchitis as a clinical entity and discuss the effects of roentgen therapy in 168 children. They define the process as

> a subacute or chronic infectious process involving the mucosa of the paranasal sinuses, with secondary implantation of the infection upon the mucous membrane of the bronchi through postnasal drainage, and with subsequent production of hilar infiltration and focal pulmonary lymphadenopathy.

They discuss the symptomatology and diagnosis with emphasis on the value of good x-ray films, a number of which are produced to illustrate the projections and variety of pathology visualized.

Roentgen therapy is directed to the sinuses and to the chest, the details of which are fully described. The results in this series were as follows: 58% fully recovered; 28% showed marked improvement; 11% showed moderate improvement; 2% showed slight improvement. The results on the whole, therefore, were very gratifying.

Huggill and Ballantyne [37] followed up closely the progress of 55 children who had a sinusitis associated with adenoids, as determined by x-rays and physical examination. They were divided into three groups according to the therapy applied. In Group 1 (20 cases) the adenoids were removed and the antrums repeatedly irrigated until free of secretion. In Group 2 only the adenoids were removed, and in Group 3

only the antrums were treated. The results showed that those children whose sinuses were treated at the time the adenoids were removed had the best chance for being cured.

Group 1 gave 95% cured or improved; Group 2 yielded 82%, and Group 3 only 50% (and then only in cases in which the adenoids were small).

It appears evident that when the x-rays reveal involvement of the antrums, these should be treated adequately simultaneously with the removal of the adenoids.

Despons [38] discusses suppurative rhinitis in children as an entity only in association with chronic infection of the sinuses, otitis media, and bronchiectasis. He feels that the etiology may be twofold: first, an inherited lack of resistance and, second, a probable acute upper respiratory tract infection or an influenzal attack which was never entirely cured. Failure to appreciate the various factors involved may account for lack of success if therapy is applied to only one aspect of the syndrome.

ARTHRITIS

Bonnet and Thiers [39] report a case of vertebral arthritis which was due to a focal infection in the frontal sinus. The patient had suffered severe pains with costal neuralgia, worse at night, for over 18 months. X-rays showed signs of an old epiphysitis extending to the region of the cervical base. A swelling at the internal orbital angle called attention to the frontal sinus, which, on x-ray examination, revealed a chronic sinusitis evidently complicated by a mucocele, or vice versa. The patient then recalled having had a nasal discharge for some time, often accompanied by frontal headache. The sinus was operated upon and found to be filled with pus. It was a small sinus whose bony walls were thickened and without a discoverable duct, evidently obliterated by chronic osteitis.

The patient obtained relief from her pains within three days and when seen a year and a half later was symptom-free.

OSTEOMYELITIS

Müller [40] discusses the development of osteomyelitis in the frontal bone occurring some time after a frontal sinus operation. He cites seven cases of his own and reviews statistics of other authors, showing that almost half of their cases underwent a similar clinical course. He attributes this late complication to two factors, namely, the failure to remove all the mucous membrane lining the sinus and the contraction of the nasofrontal passage through scar tissue or new bone development. In reoperating his cases, he removed all the mucosa and diseased bone and, after widening the nasofrontal passage, lined it with a flap according to a technique which he attributes to Uffenorde.

(Reviewer's Comment: Since there is no record as to how long these cases were observed following reoperation, one cannot draw definite conclusions as to the correctness of Müller's thesis, especially insofar as the question of removing or leaving the mucous membrane is concerned.)

Thompson, Clark, and Simons,[41] reporting two cases of osteomyelitis complicating acute frontal sinusitis, suggest the following procedure in the treatment:

1. Nasal swab and culture; identification of the responsible organism and its sensitivity to the antibiotics and sulfonamides.

2. The effective antibiotic should be given in large doses.

3. Early drainage of the responsible sinuses if ordinary drainage is inadequate. Any surgical interference, however, should be as conservative as possible. Trephining of the floor of the frontal sinus allows inspection of the interior of the sinus and of its posterior wall.

4. Vasoconstrictors intranasally, the maintenance of an adequate nasal airway and repeated antral washouts, all with the object of aiding sinus drainage and restoring the normal physiological processes.

Residual disease can be dealt with at leisure after the acute phase has subsided.

MALIGNANT TUMORS

Henschel [42] is pessimistic about the curability of cancer of the paranasal sinuses despite reports of 20 to 30% five-year cures recorded in the literature. He even quotes O'Keefe, who reported 47 failures in 47 cases.

The difficulties of achieving permanent cures are listed as follows:

1. Frequent delay in establishing early diagnosis
2. Rapid, often silent, spread into important adjacent areas
3. Difficulty in correctly estimating the degree of extension
4. Technical difficulties surrounding the surgical and roentgenological therapy

The author reviews a series of 91 cases, with tables showing the incidence of subjective symptoms, diagnostic procedures, areas involved primarily and secondarily, histologic types, and the results of the various therapeutic measures that were employed. These involved surgery, surgical diathermy, x-rays, and radium, singly or in combination.

As a result, he offers the following conclusions:

1. Surgery alone does not yield the best results.

2. Radiotherapy alone is ineffective in the epidermoid types affecting the nose and ethmoids but yields satisfactory results in the undifferentiated cellular types in which infiltration is not too extensive.

3. Radium alone has never given good results.

4. Combination of surgery and x-rays is effective in epidermoid cancer of the nose and, particularly, the antrum.

5. Surgery combined with radium is as effective as surgery and x-rays.

The results in the author's series of 91 cases showed 19 cases in which there were no recurrences. These were divided as follows:

1. One case of cylindrical epithelioma cured by surgery alone
2. Four cases of undifferentiated types cured by x-rays alone
3. Two cases of epithelioma and one of melanoma cured by surgery and x-rays
4. Ten cases cured by surgery and radium
5. One case of undetermined type cured by x-rays and radium

The percentages were these: 4 cures in 30 cases treated by x-rays alone; 3 cures in 15 cases treated by surgery and x-rays; 10 cures in 19 cases treated by surgery and radium.

Leroux and Ennuyer [43] in a very extensive article present an analysis of 104 cases of carcinoma of the ethmoid and maxilla from the point of view of therapy. The cases are divided into 10 groups according to location and degree of involvement. The authors have given up the use of radium, at least intramural, and have relied on surgery with x-ray therapy. Most of the cases reported are only in the three-year group; a few are listed as five-year cures.

The results are as follows: Ethmoidal and ethmoidomaxillary tumors were cured (three-year survival) in almost half (10 out of 23) the cases. Maxillary tumors with invasion of the ethmoid showed the poorest results—only 2 out of 65. Tumors of the maxillary sinus proper yielded cures in about one-third (6 out of 17) of the cases. Tumors of the alveolar border and lower portion of the sinus gave five cures out of eight cases despite the risk of glandular metastasis.

The authors show some 30 x-ray pictures with accompanying diagrams indicating the extent of the growth, which seem to be very instructive and formed the basis on which the therapy was outlined.

Also they show several photographs indicating the fields of exposure to x-ray in various locations, and drawings indicating the amount of radiation projected at various levels.

They prefer doing their surgery under local rather than general anesthesia because the bleeding is less and the extent of the growth is better identified.

The various external approaches to the ethmoidomaxillary region are also shown. Surgery is thorough and radical and is followed by the roentgen therapy.

They do not report good results, from either surgery or x-rays, in dealing with glandular metastases, although they find these metastases to be more radiosensitive than those arising from cancer of the tongue.

It is an interesting and thoroughly worked out presentation.

Piquet and his associates,[44] reporting their results in 72 cases treated at the Cancer Center of Northern France, seem to have fared better than the authors quoted above. Nevertheless, it is apparent that they agree on the point that neither surgery nor radiation alone can offer much chance for a cure. Their results from combined surgery, electrocoagulation, and deep x-ray therapy were much better. Here also the beneficial results were found in those cases in which the tumor was limited to the mesostructure or infrastructure of the maxilla. They do not favor the external approach but prefer the transoral, or palatine, route, which affords sufficient visibility for the most thorough application of the diathermy, which is very important.

Contraindications to this combined procedure are (1) trismus, indicating extension to the pterygomaxillary fossa; (2) involvement of the zygoma; (3) infiltration into the overlying skin.

Brunetti and Bachi [45] had a case of eosinophilic granuloma with intracranial complications in a child of 11 years. The child complained of a pulsating frontal headache with local numbness. A small swelling at the internal end of the supraorbital arch was noted, slightly soft in consistency. The temperature was slightly elevated, the patient generally asthenic, but the blood and other laboratory tests were essentially negative. (There was a history of trauma sometime previously.)

X-ray pictures showed an irregularly mottled area over one frontal sinus but no evidence of bony loss. Exploratory puncture showed that the mass was solid. A biopsy specimen was taken through a small skin incision. A fungoid mass was found protruding through an eroded bony area about 2 cm. in diameter. It was reported as eosinophilic granuloma.

Subsequently, the incision was enlarged and an attempt made to extirpate the entire growth. It was found to have eroded the sinus wall and was closely attached to the dura. In fact, the dura was involved so that a portion came away with the growth, exposing the meninges, which were normal.

The patient had a stormy convalescence with attacks of convulsions, which were attributed to irritation of the motor areas by the penicillin irrigations, which were employed postoperatively. Eventually the patient recovered, and the wound healed completely.

Histologically the tissue presented a diversity of cellular elements comprising a large number of lymphocytes intermingled with plasma cells, granulocytes, eosinophiles, and polynuclear leucocytes. Although the eosinophiles did not predominate, they were noted in small groups irregularly interspersed among the lymphocytes. The authors go into great detail describing the intricate structure of the cells, too lengthy for an abstract.

They refer to the work of Lichtenstein and Jaffe and many other authors on the subject of destructive granulomas, calling attention to the various nomenclatures suggested.

Similarity to the Schüller-Christian syndrome is commented upon, but the latter was excluded in this case because the lesion was solitary, being limited to one bone, and because the blood findings were essentially normal.

The case described by Nicelli [46] approaches more closely the syndromes of Hand-Schüller-Christian and Letterer-Siwe. The lesions were multiple and the blood findings abnormal. Both the maxilla and the mandible were involved, and changes observed in the inferior turbinates suggested a similar lesion.

Like the previous authors, Nicelli also indulges in a review of the literature with similar discussion of the histopathology.

Mesenchymal tumors present a wide variety of morphology and are usually very malignant. Three cases of histiocytic reticulosarcoma involving the ethmoids are reported by Meda and Nicelli.[47] The growths developed rapidly, extending into the adjacent areas, complete exenteration through surgery was not promising, although attempted in one case unsuccessfully. All the cases were intensively irradiated, and only one responded favorably, although the reticulosarcoma is generally considered a radiosensitive type of growth.

The diversity of the histologic pictures in these cases makes it difficult to correlate the structure with the clinical symptoms. This is well illustrated by the case histories and by the sections, which show various degrees of cellular proliferation and fibrillar structures. The planographs shown in two cases prove the value of this procedure in determining the depth and localization of the growths.

Moffett,[48] reviewing 20 cases of malignant growth of the upper jaw, nose, and nasal sinuses, finds the outlook more grave when the tumor affects the upper half of the face rather than the lower half. Contrary to the opinion expressed by some authors, he found very little difference in the degree of malignancy in the two areas. In other words, undifferentiated carcinomas are no more frequent in the upper half than in the lower half. He comments on the difficulty of making an early diagnosis in most cases, because of the lack of symptoms prior to the appearance of swelling.

The author recommends wide excision followed by radiation, and he shows diagrams illustrating the types of incision and the area to be removed. Cosmetic considerations must not stand in the way of a sufficiently wide exposure for thorough exenteration.

His final results cannot be evaluated because the cases were not observed beyond a three-year period at the time the article was published.

Wilkins [49] treated 10 cases of carcinoma of the antrum by radical excision via a lateral rhinotomy, with exenteration of the orbit when indicated. In five cases x-ray therapy followed the surgery. Three cases, in which the orbit was involved, recovered after this therapy, but the time elapsed was not sufficient to indicate permanent cure.

Heatly [50] states that dental symptoms are frequently the earliest signs of a tumor of the maxillary sinus and are frequently overlooked or wrongly ascribed. However, the dentist alone is not at fault. Just as often the rhinologist may attribute the patient's symptoms to a neuralgia or sinus infection. It is particularly important in cases of malignant growth, in which delay in making a diagnosis may reach a point where the prospects of a cure are greatly diminished. Thorough x-ray studies in all cases will lead to the diagnosis of a tumor or at least present sufficient evidence to make such a diagnosis probable, even though at times the true nature of the neoplasm is not determined until it is exposed.

Dr. Heatly presents the histories of several very instructive cases.

The five cases of cylindroma reported by Pollack [51] fully demonstrate the malignant character of this growth as well as its insidious course. Cylindromas metastasize to the viscera and the bones. Locally they infiltrate widely and may be symptomless for a long time. At other times they may develop rapidly. Pain may be outstanding if nerve sheaths are attacked; otherwise, this symptom may not appear until late. Several of the cases cited were practically inoperable, the tumor having invaded the sinuses, nasopharynx, orbit, pterygomaxillary space, and the base of the skull. Despite radical surgery and irradiation, these patients died. Intensive x-ray therapy seems to have but little influence. Four of the five cases reported were in young women. The article is well illustrated by some excellent microphotographs and x-ray pictures showing the bony metastases.

McCuaig [52] states that striped muscle cell tumors in the field of otolaryngology, although rarely reported in the literature, may, in fact, be commoner than generally supposed. Many tumors reported as round-cell or spindle-cell sarcoma may in reality be rhabdomyosarcoma. While they may present a variety of histologic pictures insofar as cellular structure is concerned, it is the presence of fibrils in the long spindle-shaped cells, with both longitudinal and cross striations, that determines the origin of the tumor.

The author reports a case in a boy of 12 years, which occupied the maxillary sinus and eroded both the orbital and nasoantral walls. It was extirpated via a Caldwell-Luc approach and was followed by x-ray therapy, with good primary results.

The case reported by Lawson [53] was in a woman of 76, who had been operated on nine years previously for a chondroma, which filled one side of the nose. Since the patient was a diabetic and advanced in years, a radical operation was not performed. Instead, the major portion of the mass was removed intranasally. It was found to have originated from the septum and had invaded the nasoantral wall. X-ray pictures and some excellent microphotographs of the specimen illuminate the article. Mention should be made of the fact that, despite prolonged irradiation therapy given before the first operation in 1942, another course of treatment was instituted after the recent operation, which the patient tolerated very well. For the time being the growth has been held in check, and the patient was greatly relieved.

Wilmot's case [54] was unusual in that the early symptoms were so meager, the patient's first complaint being disturbance of vision, due to purulent discharge from fistulae in both upper lids. Examination revealed a boggy swelling over both frontal bones, with apparent extensive loss of bony substance. The area was exposed via a coronal incision at the hair line, with the soft tissues reflected down beyond the supraorbital ridges. There was a large bony defect filled with granulomatous tissue enclosing several pockets of pus. The bony destruction involved both frontal sinuses, the posterior plates, the glabella, and the frontomalar processes. Histologic study of the tissue revealed it to be squamous-cell carcinoma. Radiotherapy was advised but refused by the patient.

NONMALIGNANT TUMORS

The report of a case of osteoma by Defrance [55] is unusual in that the author did not remove the growth. Instead, he poses the question as to the advisability of doing anything. The mass had developed slowly, with no symptoms except exophthalmos. Because of the absence of signs of any sinus complications and because of the extent of the growth, he points out the dangers of any surgery, such as infection from the nose to the meninges, hemorrhage, and the resulting deformity, necessitating subsequent plastic correction. On the other hand, if one were to temporize, there is the danger of infection of the sinuses arising from an acute upper respiratory infection and danger of increasing growth of the mass, with compression of the optic nerve and loss of vision.

The response of the discussers was what one would expect, namely, that the risks of surgery were less than those of temporizing and that the mass should be removed.

(Reviewer's Comment: The presentation seemed entirely pointless.)

Royer's case [56] was in a 26-year-old man, who first noticed a swelling at the internal angle of the orbit about a year previous to consultation. Headache had been present for two years. There had been a recent attack of convulsions with dyspnea, which was followed by loss of appetite, lethargy, and loss of interest in his former activities. Nasal examination was negative, but x-rays revealed a solid mass occupying the frontal and ethmoid areas. It was exposed through a supraorbital incision and, because of its extent and firm attachment, had to be partially morcellated before the main mass could be uncovered and removed. Its attachment was mainly in the depths of the ethmoid toward the internal boundary of the frontal sinus. A large mucocele was found, which had eroded the posterior frontal wall, exposing an area of dura about 2 cm. in diameter; the meninges were undamaged. The procedure took eight hours, but the patient recovered.

Wild and Heimendinger [57] report a series of 10 cases of osteoma of the frontal sinus, most of them very small but exhibiting a symptom which the authors consider quite characteristic, namely, supraorbital headache experienced only at night. This symptom was present in 8 of the 10 cases and disappeared after removal of the tumor. They believe, therefore, that in the presence of such a headache even the smallest osteoma that may appear in an x-ray picture should be removed.

The illustrations show several such tumors attached to the intersinus septum and various other locations. Histologic sections show the usual variety of spongy, compact, and mixed types.

Rangel [58] reports a case of osteoma of the frontal sinus in a man of 20, which partially blocked the nasofrontal duct, causing a secondary infection in the sinus. The chief complaint was headache. The author comments on the three principal theories advanced at various times bearing on the etiology of osteoma, namely, traumatic, inflammatory, and embryonic disturbances.

A case of osteoma, reported by Geissler,[59] developed rather rapidly in a boy of 15 with no history of previous trauma. It was a pedicled, lobulated affair, springing from the posterior wall of the sinus and eroding the anterior wall as well as the roof of the orbit. There was marked disturbance of vision, due to displacement of the bulb, which however, disappeared in a short time. The mass was well delineated in the x-ray pictures and was removed without difficulty.

Osteoma involving the floor of the orbit is very rare, according to Sedan and Sedan-Bauby,[60] who report such a case in a 14-year-old boy. There was a history of frequent colds, sinus infection, and enlarged adenoids—all of which had been treated surgically. Nevertheless, the nasal obstruction and repeated colds continued and seemed to retard the boy's development. Examination revealed a slight exophthalmos and a hypermetropia of 4.5 diopters in the affected eye. X-ray pictures showed the mass occupying a large segment of the orbital floor. Surgery was suggested but declined by the parents, and the patient was lost track of.

Bláha [61] describes two cases of extensive frontal osteoma. In the first case the tumor extended into the cranial cavity by eroding the posterior wall of the frontal sinus. During removal of the tumor, the exposed dura was injured, resulting in inflammation of the meninges and localized encephalitis with prolapse of brain tissue. These complications were successfully treated by administration of sulfonamides and penicillin and by surgical removal of the prolapsed brain tissue.

In the second case there was a large frontal osteoma filling both frontal sinuses and accompanied by chronic suppuration of the frontal area. As in the preceding case, the tumor extended into the surrounding area in the shape of semicircular extensions, making its removal difficult. Removal of the tumor was followed by a definitive cure of the chronic inflammatory condition of the middle ear, which had lasted for a number of years.

Dintenfass, Ellbogen, and Ersner [62] report a case of ossifying fibroma of the ethmoid in a woman of 25, which had been treated as a sinusitis for a long time until accurate roentgenologic studies revealed the nature of the growth. It was exposed through an external incision and found to be a soft, mushy mass filling the entire ethmoid area up to the orbital plate. It had to be removed piecemeal, and the resulting cavity measured 25 by 15 by 10 mm. Pathological report revealed

> dense collagenous connective tissue which supports a few primitive bone spicules. Another section reveals multiple bone fragments separated from one another by bands and islands of connective tissue which is young in type, being predominantly fibroblastic.

Maxwell and Blackstone [63] present a classification of odontogenic tumors comprising varieties of ectodermal, mesodermal, and mixed types. The varieties are determined by the predominance of the various undifferentiated cells, the amount of calcification, and the general texture of the growth. As a rule they are benign, although at times a malignant tendency may supervene.

The case presented was in a 20-year-old man, showing a moderate enlargement of the buccal surface of the maxillary tuberosity. X-rays revealed a large radiopaque

area in this region, which almost obliterated the antrum. The tumor was removed in sections via a sublabial incision. The tissue was dense and seemed to be made up of osseous as well as odontogenic material. A molar tooth was found imbedded in the mass. The patient made a favorable recovery.

Heck [64] saw a case of adamantinoma in a boy aged 4 years, which had invaded the orbital floor, necessitating a complete exenteration of the orbit, left maxilla, part of the zygomatic bone, and the pterygoid process. The cavity was lined with an epithelial graft and later was fitted with a prosthesis. Sections of the tissue showed a stellate reticulum, with darker staining epithelial elements resembling embryonic tooth structures.

The author presents a description of the development of the tooth structure in its various stages and a classification of various malformations that may appear.

Weaver [65] goes through the list of tumors of the maxillary antrum with references to the literature and describes several cases of his own. These include a dentigerous cyst, an ossifying fibroma, a giant-cell tumor, and a squamous-cell carcinoma, with illustrations showing plastic closure of the facial defect after removal and a dental prosthesis for palatal defect.

Desvignes and Brun [66] report a case of mucocele following a bullet wound sustained some 25 years, during which time it had been symptomless. The mass was the size of a nut, situated at the internal angle of the orbit and causing a displacement of the bulb. It was firm and adherent to the bone and was located just below a depression in the frontal bone due to the previous trauma. The eye was blind; neurologic examination was negative and the x-rays inconclusive.

The growth was approached via a frontal incision exposing the roof of the orbit, which was found to have been completely destroyed. A small intracranial mass was found as well as a cystic mass, the two being separated by a zone of adherent dura. When the fluid was evacuated from the cystic mass, the authors found an area of cystic cerebral tissue, atrophic as in porencephalitis.

It was necessary to incise the dura, to remove all the scar tissue in the anterior pole, which extended back almost to the ventricle. The patient made an uneventful recovery.

The authors comment on the advantages of the frontal approach in tumors of the orbit over the orbital or temporal approaches. Also they advise collaboration with a neurosurgeon in such cases, since it is not always possible to determine in advance whether the growth has invaded the cranial cavity. Once the orbit is exposed by the frontal approach, this matter can be determined easily. If the mass is entirely orbital, the ophthalmologist may proceed to remove it. However, if it invades the cranial cavity as well, the neurosurgeon can take over.

The authors concede that small orbital tumors anteriorly situated may be removed through an orbital incision and also that deep-seated tumors in the sphenoid region or about the apex of the orbit are best exposed via the temporal route.

In the discussion that followed it was pointed out that planography frequently is helpful in localizing some orbital tumors. Also, there seemed to be unanimity of opinion that while the frontal approach was simpler and less dangerous, and successful in certain types of cases, one could not exclude the other methods, when properly indicated.

Cerabolini [67] devotes considerable space to a discussion of the pathogenesis of mucocele, citing numerous authors, all of which has been stated many times. The

two mucoceles reported by the author were unusually large, one being the size of a hen's egg. In both cases there was extensive destruction of the posterior and orbital walls of the frontal sinus, with wide exposure of dura and orbital lining. Also, in one case the mucocele had eroded the interfrontal partition, thus extending into the opposite sinus. The x-ray pictures, though not too clear, do show the extent of the mucoceles.

Mucocele of the maxillary sinus is quite rare. Matheus [68] reports one in a woman of 41, who had previously had two operations on the antrum, at 21 and 29 years. A Caldwell-Luc approach revealed typical fluid and considerable scar tissue. Cytological examination showed mucous filaments, erythrocytes, leucocytes, and epithelial cells. No bacteria were found.

DeSanson [69] does not believe that there is such a thing as a primary mucocele of the maxillary sinus. It is questionable as to whether such a mucocele possesses a membrane of its own, and he is of the opinion that such a mucocele originates in the ethmoid cells and probably from only a certain group. The same applies to mucoceles of the frontal sinus and sphenoids.

A case in point is cited in which a chronic sinusitis was followed over a period of years until a sublabial swelling and x-ray pictures seemed to indicate a cystic mass with destruction of the inferior border of the orbit and the molar region. It was exposed via a Caldwell-Luc approach. An extensively dilated cystic cavity was found, which had caused considerable absorption of the surrounding bony walls. Although it looked like a mucocele, the absence of cholesterin crystals would rule this out, in the author's opinion, who concludes that it was a case of sinusitis with dilatation.

Kravitz [70] comments on the comparative infrequency of mucocele, citing statistics from the Brooklyn Eye and Ear Hospital, where, during the course of 15 years, only 9 cases were encountered out of a total of 327,420 patients. He presents four cases seen personally and discusses the diagnosis and treatment.

Balestra and Ghislanzoni,[71] in a very thorough presentation, emphasize the radiologic aspects in the diagnosis of retention cysts of the maxillary sinus. The pictures are excellent, showing various cysts in conventional projections, laminograms, and with contrast media. Certainly they leave nothing to be desired from this point of view. The authors are of the opinion that these cysts are due to occlusion of the gland ducts as well as interference with ciliary activity. The symptoms are varied; there are occasional neuralgic pains, local discomfort, general irritability, and, at times, no symptoms.

Bompoint and Rabechault [72] report two cases of intractable frontal headache, which were relieved by the removal of mucous cysts of the antrum. In the first case there were no local symptoms or findings aside from the x-rays. In the second case there was some nasal discharge and local tenderness. The authors state that the mere presence of these cysts, as shown in routine x-rays, should not be considered an indication for surgery. The latter is to be considered only if the headache cannot otherwise be accounted for, or if there is evidence of sinus infection.

Judge [73] reports two cases of papillary sinusitis, one of which was subjected to an external frontoethmoid operation and the other to a Caldwell-Luc operation in addition. He reviews the literature and comments on the diversity of nomenclature applied to this condition by various authors, such as epithelial polyp, epithelial papilloma, diffuse or soft nasal papilloma, and fibroepithelial polyp. The condition

is rare, only nine specimens having been found out of 1,200 patients examined at the Manhattan Eye and Ear Hospital and a Veterans Hospital. It is characterized by a "metaplasia of the epithelium and an inward growth of the epithelium forcing the stroma apart." Papillary formations are quite characteristic. Virus infection has been suggested as a possible etiologic factor, and some authors believe it to be a precancerous phenomenon. Yet, although recurrences have been noted, malignant degeneration has rarely been observed. Nevertheless, the lesion should be viewed with suspicion.

Holmes, Sweet, and Kelernen [74] report three cases of hemangioma of the frontal bones, all in women of middle age. Two were operated on, with good results. The third case did not warrant operation. In one case the frontal sinus was involved. The pathogenesis is not known, although in several cases previously reported the growth originated in the tuber frontale. A division into capillary and cavernous angiomas is unwarranted, because in the beginning the angioma is always of the capillary type. Later, blood lakes may form by confluence of the former.

X-ray pictures show a localized area of bone absorption with some mottling.

The illustrations show various sections of bony specimens removed, and there are x-ray pictures of cases cited.

These cases are quite rare and do not come to light until pressure of the growth causes frontal pain.

Moore's case [75] was in a child aged 20 months, who presented a widened nasal bridge, more prominent on one side, and a fleshy appearing mass. When probed, it seemed to have its origin high up on the septum. The mass was aspirated, and the fluid removed showed a total protein of 41 mg. per 100 cc. Lumbar puncture failed to decrease the size of the mass, and the injection of indigo carmine dye failed to appear in the subsequent aspiration of the mass. Penicillin was given freely and the cyst removed intranasally. After removal, a dehiscence was observed in the cribriform plate. A frontal craniotomy revealed the dehiscence, which was closed with tantalum mesh. Recovery was complete.

Histologic analysis of the specimen corroborated the diagnosis of an encephalomeningocele. The author reviews the literature and presents a summary of previously reported cases.

Brunner [76] states that tumors of the frontal bone are less common than in the ethmomaxillary region, because the sinus is not as closely related to the nasal cavity anatomically as the ethmoids and the antrum, and because frequently the frontal sinus may be absent or only partially developed. He cites several interesting cases in which the diagnosis was obscure, and shows x-ray pictures and histologic preparations, which point out the important characteristics. One was a small hemangioma, very close to the upper limit of the sinus, in which the pictures showed the diploetic veins from which the tumor originated. Other cases shown are a gumma of the frontal bone, a traumatic periostitis, osteogenic sarcoma, and chronic osteomyelitis, which in some respects resembled the sarcoma case. The histologic examination of bone fragments brings out some of the characteristics of these different types, which are worthy of close study.

Bruce and Royer [77] describe a case of fibromyoma of the maxilla in a boy of 14. It appeared as a painless swelling in the left upper canine region, which in the x-rays was visualized as a radiolucent area displacing the roots of the canine tooth and

lateral incisor. It had the appearance of a cyst but on removal was revealed as a pinkish semisolid mass. Microscopic examination showed it to be composed of widely spaced spindle-shaped and stellate-shaped cells of various sizes. The ground substance was a fine fibrillar material. There were some areas of vacuolated mucoid substance.

Speculating on the genesis of the growth, the authors rejected the possibility of its being of dental origin, since there was no apparent connection with either the periodontal membrane or the dental papillae. It seemed more likely to have originated from a rest of mesenchymal tissue.

A case of fibrocystic osteodystrophy of the ethmoid in a woman of 21 is described by Giussani.[78] It began about three years previous with headaches, nasal discharge, and epistaxis, followed progressively by nasal obstruction and exophthalmos. X-ray pictures showed a diffuse shadow, not readily or clearly outlined, occupying the ethmofrontal area and orbit. It was first suspected as being a sarcoma. There was no history of trauma. At operation the mass was disclosed as being more extensive than indicated in the pictures. It consisted of a thin bony shell lined with a layer of fibrous tissue and containing fluid. It extended into the orbit, frontal and sphenoid sinuses, and nasal septum, down to the floor of the nose. After the operation a picture was taken with the cavity filled with contrast medium, which accurately delineated the extent of the growth. Recovery was uneventful.

There is a long description of the histologic studies of various portions of the growth. A review of the literature citing numerous authors is included, with comments on points of similarity of the growth to Recklinghausen's and Paget's disease.

SURGERY OF THE SINUSES

Lake [79] divides chronic sinusitis into four general groups, namely, suppurative, hyperplastic, allergic, and mixed. Differential diagnosis depends on the history and findings. Purulent postnasal discharge, frequently odorous, is characteristic of the suppurative type and is not to be confused with the moderate mucoid postnasal drip usually apparent only in the morning. Headache is commoner in the allergic type, although it is commonly encountered in the mixed types. The author refers to Lewis' classification of pain as either superficial, cutaneous, or deep and muscular. The latter may also originate from vascular spasm. Lake then follows with a reference to Williams' work on headaches, which consists of an analysis of all the factors bearing on the headache, its origin, duration, location, and relationship to extrinsic as well as intrinsic factors—all of which information may determine the true etiology and differentiate between allergy and true sinus infection.

After the diagnosis is made, surgery will depend on the sinus involved and its possible extensions. In most cases the nasoantral window in the inferior meatus will suffice. If the ethmoids are concurrently involved, it may be necessary to do a Caldwell-Luc and transantral ethmoid exenteration. Much depends on the extent of the ethmoid labyrinth and its relationship to the frontal sinus and orbit. In many instances it is impossible to thoroughly expose all the cells via the intranasal or transantral route, and it may be necessary then to resort to an external approach. Decision as to the right procedure depends on the judgment of the surgeon and his correct appraisal of the condition from the evidence presented by a study of the patient, results of careful examination, and correct reading of the x-ray films.

Montandon and Baumann [80] believe that the transantral exenteration of the sinuses according to the method of Pietrantoni and de Lima, because of its simplicity and lack of danger, is indicated in most cases of chronic sinusitis, in which the infection is rarely limited to one sinus. They describe the anatomy of the ethmoid labyrinth and its relationship to the frontal, antrum, and sphenoid. The technique is outlined in the following steps:

1. Exposure of the canine fossa via a sublabial incision.

2. Removal of the entire anterior wall of the antrum up to the infraorbital foramen and enough of the ascending process of the superior maxilla to fully uncover the anterointernal angle of the sinus.

3. Removal en bloc, if possible, of all the antrum mucosa.

4. Identify the maxillary ostium by means of a probe inserted via the middle meatus. Then remove the posterointernal wall of the sinus posterior to this orifice. This area is often polypoid and membranous.

5. Clean out the ethmoid mass above, behind, and in front. The internal wall of the orbit is one of the most important landmarks and should be meticulously exposed.

6. The sphenoid is opened via the excavated posterior ethmoid area in an oblique direction inward, above and below, which is exactly the line passing through the superointernal angle of the antrum. One has to avoid the sphenopalatine artery, which is located several millimeters below, and the optic nerve, which is usually very high up and external.

7. The sphenoid is cleaned out, enlarging the orifice medially rather than externally.

8. The periorbital ethmoid cells posteriorly are now cleaned out.

9. Curette the anterior ethmoid cells, especially the agger nasi and frontoethmoid group, directing the instrument externally and downward. One can often feel the end of the curette with the finger placed medially to the internal angle of the orbit.

10. The floor of the frontal is now broken down, especially external to the midline.

11. Counter opening into the nose via the inferior meatus. This step may be omitted if there is already a large opening between the antrum and the nasal cavity, otherwise the attachment of the turbinal may be endangered.

12. In exceptional cases the frontal may have to be opened externally, particularly if there is a large orbital extension.

The authors claim exceptionally good results in the suppurative cases as well as in those associated with asthma.

This is the second in a series of articles by Padrón [81] covering all phases of sinusitis, and is devoted principally to a consideration of therapy in sinusitis complicated by allergy. He presents a detailed table of differential points in the diagnosis between infection and allergy. The blood changes observed in allergic crises are listed as fall in blood pressure, lowered temperature, drop in the pH and alkaline reserve, hyperglycemia, inversion of the leucocytic formula, leucopenia with neutropenia, eosinophilia, augmented sedimentation rate, hyperproteinemia, hemoconcentration of serum, prolonged bleeding time, and reduced coagulation time.

The discussion is continued in the next number.

In this presentation Padrón [82] takes up the surgical therapy of combined suppurative and allergic disease. He describes the Lothrop, Sibileau, Halle, and other frontal sinus procedures, also the various maxillary and ethmoid operations. He does not favor intranasal antrostomy and prefers the transcanine route for the majority of cases. The advantages and disadvantages of these procedures are enumerated in detail, which leaves the choice up to the individual surgeon.

The article is informative but could hardly be considered a critique. It is to be concluded in a forthcoming issue.

Myers,[83] in analyzing the record of sinus surgery over a period of several years, finds that the number of cases operated on has been gradually diminishing. This is attributed to increasing knowledge of the physiology of the nose, greater awareness of the role of allergy, availability of antibiotics, and the role of psychosomatic medicine.

Various surgical procedures are discussed. In cases of alveolar fistulae resulting from dental pathology, the author has used tantalum foil below the sutured mucosa in three cases, with good results. He claims that it affords a solid base over which the mucosa heals more rapidly, preventing a possible breakdown from the suction produced in eating and talking.

Braksiek [84] believes that all chronic bronchial diseases, such as chronic bronchitis, asthmatic bronchitis, and bronchiectasis, are but associated manifestations of a chronic infection of the entire lining of the respiratory tract and that, therefore, the sinuses are at fault and should be properly treated, even though they may be symptomless. He advises preliminary trial of conservative treatment consisting of daily irrigations and instillation of a suitable antibiotic.

Should this fail after a two weeks' trial, surgery should be undertaken. Since the antrum is usually not the sole seat of the infection, he suggests a combined procedure to eliminate both the antrum and frontal sinus infection, leaving the ethmoids alone except for removal of polypi. He does a Caldwell-Luc operation, removing all the mucosa but making no counteropening into the nose. This is followed by an external frontal sinus operation, in which a small opening is made near the midline, just large enough to admit a Falkner curette, which removes all the mucosa. The region of the nasofrontal duct is not touched except for the passage of a probe to identify it. A glass-tube drain is inserted, and the cavity is gently irrigated with an antibiotic solution. No drain is used in the antrum, which is not molested in any way after the operation.

The author claims that by this procedure he not only eliminates the disease foci but preserves the normal ostiums and intranasal landmarks and gets the patient completely well in 12 to 14 days.

Capps [85] presents an analysis of his results in the treatment of 200 cases of chronic maxillary sinusitis. These are divided into three groups: (1) puncture and lavage, 61 cases; (2) intranasal drainage (antrostomy), 93 cases; (3) Caldwell-Luc operation, 18 cases.

Of the 61 cases treated by simple irrigation, all but 5 were cured; 3 of these cleared up after antrostomy, and in the other 2 surgery was refused. Of the 93 cases treated by antrostomy, 82 were outright and lasting cures, 4 were improved, and 2 were failures, which later were operated upon (Caldwell-Luc approach). In several cases ethmoidal polyps were removed at the same time.

The decision to perform a Caldwell-Luc operation was based on the following considerations: (1) "a tight puncture and washout suggestive of gross polyposis; (2) long-standing dental sepsis; (3) gross ethmoiditis, and (4) very thickened and obviously polypoid lining on x-ray."

Failure of the intranasal operation was in most cases attributed to inadequate opening, due, in some cases, to a septal deformity, large turbinate, or anatomically narrow nasal passages.

It is apparent from the careful analysis of this group of cases that the author is firmly of the opinion that radical exenteration of the antrum lining is unnecessary in the vast majority of cases.

Incidentally, he does not favor irrigation via the natural ostium, a procedure which, he believes, inflicts more trauma than the needle puncture.

Sibbald [86] describes the osteoplastic technique and obliteration of the frontal sinus as practiced by Tato. A series of diagrams shows the step in the operation. Emphasis is placed on the value of an x-ray picture with a grid ruled off into squares, which serves as an accurate guide in making the flap. The sinus lining is completely removed with a Freer elevator and a burr, to reach the various narrow recesses. The nasofrontal duct is closed by reflecting its lining downward, often reinforced with a strip of fascia lata or periosteum derived from adjacent bone. The sinus cavity is filled with fat taken from the abdominal wall or fibrin sponge, gelatine sponge, coagulated blood, desiccated serum and plasma. After the bony flap is replaced and the wound closed, a pressure bandage is applied and antibiotics administered. Although suppuration occurs frequently within the cavity, it seems to be overcome before the closure of the duct.

DeSanson,[87] reviewing a series of 1,089 cases of maxillary sinusitis, of which 597 were uncomplicated by involvement of the other sinuses, reports 90.8% cured following surgery. Cases in which the antrum or sphenoid are infected alone offer the best prognosis for cure. In most of his cases the Caldwell-Luc technique was employed. As for the frontoethmoid cases, the decision between intranasal and external surgery depends on the surgeon as well as the anatomic arrangement of the cells. The author cites conflicting opinions on this point, so that unanimity is far from being attained.

Boyden [88] reports having done the Sewell operation on 57 patients, with excellent results. The prime objective, namely, maintenance of the patency of the duct, is accomplished by the mucosal flap described by Sewell, which covers the denuded bone about the opening, thus preventing the growth of granulations, which so often lead to occlusion. The ethmoid cells are removed in order to provide a wider egress from the frontal sinus. No packing is employed, but a rubber tube is left in place for a few days, to secure the flap.

Shahinian [89] argues that the advantage of the Caldwell-Luc procedure, in addition to better visualization of the lining membrane, is in the matter of creating a proper nasoantral window. He contends that removal of the entire mucosa is rarely advisable, since epithelialization fails to keep pace with the building up of granulations over the denuded bone, thus resulting in a markedly constricted cavity. Therefore one should endeavor to leave the mucosa intact, so far as possible, removing only the polypi and localized cysts and abscesses. The nasoantral window should be so prepared that mucosa from the lateral nasal wall is brought into contact with that of the inner wall of the sinus so as to completely overlap the bony wall, which is taken down as closely as possible to the floor.

Miller and Long [90] found streptokinase and streptodornase very effective in cleaning up the thick foul discharge from an infected antrum associated with an antro-oral fistula, preliminary to the operation for closing the fistula. They instilled 75,000 units of streptokinase and 25,000 units of streptodornase once or twice daily via an indwelling polyethylene tube inserted into the antrum through a trocar open-

ing in the inferior meatus. The treatments were carried out for about two weeks prior to operation, at which time the patient was subjectively improved and the drainage material reduced in amount and consistency.

Rajner [91] found 12 cases on which the classic Caldwell-Luc operation was performed in which the anesthesia of the cheek and lip persisted for a long time and, in some instances, was accompanied by changes in the peridental membrane with damage to the teeth. He therefore advocates a vertical incision with a smaller opening through the bone.

NONSURGICAL THERAPY

Silcox [92] believes that hyperplastic sinusitis is due to a bacterial sensitivity and will yield to vaccine therapy even in the presence of an allergic factor. A group of 200 allergic patients with hyperplastic sinusitis were treated with autogenous vaccines. Of these, 170 were improved or markedly improved, 26 were not improved, and 4 were made worse. Skin tests with the vaccines were positive in 57% of the cases.

Of the whole group, 64% were considered to have a reversible type of pathology and 36% irreversible. This was determined from a study of the patient and his response to vaccine therapy. (This is a rather empiric method and subject to criticism, since determination of reversibility or its opposite is possible only after histologic study of the mucosa.) However, in the present instance the author did not resort to surgery until the vaccine therapy and treatment of the allergic factors were thoroughly carried out.

Thomas and Malley [93] demonstrated the value of sensitivity tests in the treatment of bacterial infections of the sinuses. The case in point was in a woman of middle age with a recurring maxillary sinus infection, which had been operated upon intranasally, without relief. Bacteriologic examination of the secretion showed a pure culture of Friedländer's bacillus. Sensitivity tests showed it to be most sensitive to streptomycin. A solution used in the form of nose drops reduced the number of bacteria but proved quite painful. However, when the antibiotic was administered by intramuscular injection, the bacteria disappeared rapidly and the patient was cured. Five-tenths cubic centimeter was given twice daily for 22 days.

Williams [94] discusses the effects of corticotropin (ACTH) and cortisone on body processes, calling attention to some of the unfavorable side-effects. He cites some of the recent reports on the use of these agents in allergic conditions of the nose but is unable to corroborate their favorable results. However, he is impressed with the favorable action of these agents in the treatment of idiopathic lethal granuloma. The author cautions against the indiscriminate use of them, at least until more is learned of their ultimate effects.

Pallestrini [95] reaffirms the principles of successful antibiotic therapy in sinusitis. These are the selection of the proper drug in relation to the sensitivity of the organism, administration in such a manner as to bring the agent into contact with the bacteria, and the continuation of the therapy until the healing is complete.

Haas [96] employed a preparation called Tyrosolvin, a solution of tyrothricin in ammonium base cetylpyridinium chloride, made by Chem. Fabrik, Constance, Germany. He instilled it in 20 cases of maxillary sinusitis, with cure in all but 4 of the chronic cases. There were no instances of unfavorable reaction, and in no case was any hemolytic action noted. Careful bacteriologic examinations from sterile irriga-

tion fluids obtained prior to each Tyrosolvin instillation revealed a reduction in the number of bacteria to normal limits. This was done by centrifuging the solutions and culturing the sediment. The bacterial count was considered normal when it was reduced to the level of the count in similarly treated solutions obtained after irrigating normal sinuses.

The four failures noted were in cases in which subsequent surgery revealed irreversible changes in the sinus mucosa.

King [97] believes that the systemic administration of chlortetracycline (Aureomycin) and penicillin is a distinct advantage in the postoperative treatment of chronic sinusitis. This is based on observations in a series of 40 cases. Chlortetracycline was given in an initial dose of 3 gm., followed by 1 gm. at eight-hour intervals for seven days. Penicillin G procaine, 300,000 units, was given intramuscularly twice daily for three days. There were four instances of major relapses, requiring further surgery, and four minor relapses, which yielded to continued therapy. Failure of the therapy in the few cases listed was attributed to irreversible changes (which necessitated exenteration), probable allergic factors, and infective organisms resistant to the antibiotic.

A number of typical cases are cited and the results of the bacterial analysis presented in detail.

Strong and Tonkin [98] found that instillations of penicillin G procaine in oil proved effective in the treatment of subacute and chronic maxillary sinusitis, as evidenced by the results in 31 consecutive cases. Bacteriologic examination revealed a variety of bacteria which were penicillin sensitive, except Hemophilus influenzae, Pseudomonas pyocyanea, and Proteus vulgaris, which were present in eight cases. The instillations were done at intervals of five to seven days. After irrigation, 1 ml. of the solution was instilled. This was repeated until the irrigating fluid returned clear. In 25 cases of subacute infection the response was prompt and favorable. In 10 chronic cases the response was also favorable. There were no undesirable local or constitutional reactions.

Sparkes,[99] in a series of 54 cases of chronic sinusitis, had excellent results following the use of nasal tampons twice daily. These were saturated with a solution of 24% ammonium sulfoicthiolate and 76% hydrous glycerin, introduced in Vancouver, B. C., Canada, under the trade name of Nevo. Improvement was noted in over 80% of the cases, as observed through transillumination, diminution of discharge, and improvement in the subjective symptoms. Treatment was continued for 5 to 20 days, and the good results were confirmed at examination three months later.

Livingstone [100] summarizes the treatment of acute sinusitis as follows: rest in bed, fluids, anodynes, systemic penicillin daily, ephedrine nose drops, and steam inhalations. He advises against nasal douching, the use of volatile inhalers, and short-wave diathermy or infrared or displacement therapy during the acute stage. Lavage of the antrum may be practiced as soon as the acute stage is over. The frontal sinus should not be touched unless it is necessary to release pus under tension.

Reed [101] states that effective displacement of opaque oils for diagnosis in sinus disease may be accomplished by the "reverse Valsalva" procedure. The patient is placed in the supine position, with head low over the end of the table, 5 cc. of oil is instilled into each side of the nose, and negative pressure supplied by having the patient inhale deeply against the closed nares and lip. After three forced inspirations the patient exhales slightly through the open mouth. Additional fluid may be

instilled and the procedure repeated. The negative pressure developed in this manner reaches an average of 50 mm. Hg, which is sufficient in the average case to permit the oil to displace the air in the sinuses. This was demonstrated by x-ray pictures in a high percentage of 25 cases thus examined.

Cervantes [102] tried the Ruskin treatment in eight patients, with no results. This therapy consists of daily injections into the sinus of a solution of penicillin G [procaine] on several successive days. He states that the treatment may be of help in cases of true inflammatory conditions but is not at all effective when true polyposis exists.

Hughes [103] shows how he prepares an applicator for the intracavity irradiation of an antrum or mastoid exenterated for malignancy. If the radium is to affect all parts of the cavity properly, it must be properly distributed. An impression of the cavity is taken with Zelex, an alginate compound which can be poured into the cavity as a paste. It is elastic, does not adhere, and retains its shape.

Also, Paribar, a thermoplastic which can be removed while still plastic, regains its shape after removal. Cavities whose dimensions are greater than the diameter of the outlet should have the applicator prepared in three sections, the central one being keystone shaped to fit into the two lateral portions which fill the rest of the cavity. A model replica in three sections is made out of wax, which is then duplicated in acrylic. This is then drilled for the reception of the radium applicators. When the cavity communicates with the mouth, it is necessary to provide an oral support, which deflects the tongue away from the radium sources. This process ensures more accurate placement and retention of the radium.

When the entrance to the cavity is wide enough, the applicator can be made in one piece.

Goodale and Mangiaracine [104] have found coagulase-positive hemolytic Staphylococcus aureus so prevalent in cultures from the nose and throat as to be suggestive of a normal biological condition. It is likely that when the balance between its virulence and the patient's immunity is disturbed, great damage may result. A selected series of 42 cases, including recurring acute sinusitis, sinusitis with allergy, recurring acute pharyngitis, and nasal furunculosis, treated with an autogenous vaccine was carefully followed up for a number of months and the results tabulated. The net result was 17 cases improved (no recurrence), 20 improved but with subsequent relapse, and 5 with no improvement. In a comparison of the results obtained in a series of 71 eye cases similarly treated, the percentage of improved cases was less than in the latter.

The authors do not advocate vaccine therapy as a substitute for properly indicated surgical, medical, or hygienic treatment but are convinced of its value in those cases in which the hemolytic Staph. aureus is the basic cause of the trouble.

Robison,[105] who in previous communications has explained the mechanics of the balloon-pressure treatment within the antrum for the reduction of chronically swollen mucosa, presents in this current paper its clinical application in certain types of maxillary sinusitis. The procedure consists in the introduction into the antrum through an antrostomy opening of an inflatable rubber balloon attached to the expanded head of a catheter. The balloon is filled with iodized oil and the catheter then tied and cut off to just within the vestibule. The pressure of the oil within the balloon gradually forces it to conform to the outline of the interior, thus exerting equal pressure throughout. The balloon is usually worn for two or three months and may be reinserted at a later period.

The author recommends the procedure in all cases of subacute and chronic maxillary sinusitis in which the changes are not irreversible and there are no polypi present. It is equally effective in subacute and chronic allergic sinusitis, in many instances complicated by asthma. In selected cases it is more effective than a Caldwell-Luc operation, because it restores the mucosa to a more normal status with good ciliary activity.

The procedure is contraindicated during any acute inflammatory process, acute purulent or acute allergic sinusitis, seasonal hay fever, and acute uncontrolled bronchial asthma, particularly if associated with a high eosinophile level in the blood.

Prigal [106] in a lengthy article reviews the history of aerosol therapy and his own experience with steam-generated aerosols during the past six or seven years. The apparatus he uses is a simple one in which steam is generated in a container under pressure and, passing through a small aperture, picks up and aerolizes the medicament. The particles thus broken up measure about 2 to 3 μ. He discusses the various antibiotics, their affinity for certain types of bacteria, the importance of cultures for the proper selection of antibiotics, and their use by this method in bronchitis, sinusitis, atelectasis, and other conditions. He records a high percentage of favorable results in a large series of cases.

Failure of the therapy is attributed to the following factors: (1) improper dosage and too early discontinuance of therapy; (2) failure to use the proper antibiotic; (3) failure to recognize and treat allergic factors or psychologic factors. Also in some instances the presence of a carrier in the family has been responsible for frequent recurrences.

He found that the bacterial flora changed from one series to another, possibly due to changes in sensitivity of various types. Also, it is quite certain that certain strains are still unaffected by our present antibiotics. It is therefore important that the epidemiology be closely followed. The author believes that this form of therapy has much to offer in the future.

Rebattu, Gaillard, and Chagnaud [107] have found aplasia of the frontal sinus to be more frequent than generally supposed. In a series of 1,100 radiographs they saw 42 unilateral and 20 bilateral aplasias. The appearance in the x-ray pictures was variable. At times the bone appeared smooth, regular, and eburnated. In other cases it appeared polycystic and mottled, offering possible sources of diagnostic error. No satisfactory explanation has as yet been offered for this anomaly.

The authors are especially interested in this finding because of its possible connection with unexplainable headaches. Cases have been observed in which trephining the area has brought relief when other measures failed. However, they do not advise resorting to surgery until other etiologic factors have been eliminated, and these should include proper psychotherapy.

Pagano [108] describes the symptom of barotrauma affecting the sinuses as a severe fronto-orbital pain radiating to the temporal area, coming on rapidly after descent from an altitude, and usually lasting several weeks, although ameliorated at times by vasoconstrictors and analgesics. X-rays usually show diffuse clouding of the sinuses, such as seen in chronic hyperplastic sinusitis. He discusses the mechanism whereby rarified air is trapped in the sinuses by swelling or obstruction in the vicinity of the ostium, all of which has previously been presented by Campbell and others. The author's observations were made in 100 caisson workers, among whom

the air pressure differential produced symptoms akin to those observed in fliers but in reverse. He finds that, aside from anatomic factors predisposing to obstruction, a hyperactive neurovegetative apparatus can contribute markedly to the syndrome. He therefore recommends therapy that will tend to regulate sympathetic reactions, plus cyanocobalamin (Vitamin B_{12}).

Sudden changes in air pressure and obstruction are not sufficient in themselves to explain the phenomenon. One must consider also the oxygen percentages, duration of stay in the caisson, and the state of equilibrium of the neurovegetative system.

CLINICAL ASPECTS OF MAXILLARY SINUS DISEASE

Czurda [109] reports two cases of blastomycosis from the Vienna Policlinic. One was that of a 37-year-old man, whose complaint was impaired vision and proptosis. Examination revealed a paresis of the abducens and internus, a subconjunctival infiltrate of the bulb, and cloudiness of the sinuses. The antrum was opened via the canine fossa and granulomatous material removed, which, after extensive staining and culture, yielded a plant fungus. An extensive operation was done, exenterating the antrum, ethmoids, and sphenoid. The infection was found to have invaded the orbit. A secretory middle-ear catarrh also contained the fungus. The tonsils were removed for cause and also revealed the same fungus. The process was halted by the administration of iodides, and after a year and a half the patient's general condition was good and the ocular symptoms were relieved.

The second case was that of a 62-year-old man, who had an inflammatory infiltration of one side of the nose extending to the cheek and lid. The nasal cavity contained a greyish-red mass, which, on biopsy, was diagnosed as specific granulation tissue. Cultures for the fungus were spoiled through an overgrowth of enterococci. However, since the patient had scars on his tibia and a history of having been treated by a dermatologist for actinomycosis, he was put on a regimen of potassium iodine, x-ray exposure, gentian violet (Pyoktanin), and undecylenic acid. Despite all these measures, the process continued to advance, leading to extensive ulceration of the face, massive impetiginous crusts, dacryocystitis with fistula, and loss of one ala nasi. One side of the nose showed a tendency to heal, and the disease spread to the opposite side, involving the lip and alveolus, with penetrating ulceration and exfoliation. The patient died of sepsis, and at autopsy only enterococci were recovered, evidently having developed in symbiosis with the fungus, which was finally identified.

DeMartini,[110] in a fairly extensive monograph, reviews the relationship of the teeth to the nasal cavities and sinuses insofar as the extension of infection from the former to the latter is concerned. He takes up the embryology, anatomy, and histology of the structures, types of odontogenic infection, paradental cysts, and nasobuccal fistulae.

To reach the nose and sinuses from apical or peridental foci, three types of infection may be considered: (1) osteophlegmon or abscess formation, either supraperiosteal or subperiosteal; (2) osteitis proper, that is, a circumscribed rarefying necrosing lesion of the alveolus about one or more teeth, and (3) diffuse osteomyelitis involving greater areas of the maxilla.

An apical abscess of an incisor whose root is in close proximity to the nasal spine may spread into the septum, causing a septal abscess. Also, it is possible that

the infection may spread along the plane of the muscle fibers. In other cases involving the lateral teeth, an apical abscess may destroy the intervening bone of the antral floor, resulting in a submucous abscess.

Irrespective of the original focus, the most important consideration in all these cases is proper diagnosis by means of adequate x-ray studies. Once the areas involved have been properly delineated, the matter of therapy may be more definitely outlined. In some cases, apicectomy with drainage of the abscess may suffice. In other cases, the offending tooth may have to be extracted. In chronic cases with hyperplasia and deterioration of the sinus mucosa, more radical measures will be indicated. Antibiotics have proved very helpful, particularly in the cases of osteomyelitis.

The therapy of paradental cysts is discussed and treatment suggested according to the size and location. Small cysts may be opened, evacuated, and allowed to fill in with granulation if they do not encroach into the sinus. Larger cysts growing into the sinus will require a regular Caldwell-Luc operation.

The procedures suggested for closure of the oral fistula are practically the same as advocated here. Emphasis is laid on the value of a good palatal flap to ensure success.

Weissenau [111] lists the possible dental affections which may involve the antrum as acute root abscess, chronic periodontitis, trauma following extraction, dental cysts, necrosis of the alveolus, and unerupted teeth. The differential diagnosis between odontogenic and rhinogenic origin of antrum infections may at times be difficult. A careful history, thorough examination of the teeth, and adequate x-ray studies should, in most cases, establish the diagnosis.

In the treatment, the author recommends extraction of the diseased tooth and daily irrigation of the antrum. If this fails to clear up the sinus infection, he advises a Caldwell-Luc exposure.

Harkness [112] discusses the clinical aspects of maxillary sinusitis, emphasizing the value of conservative therapy in promoting drainage and ventilation. The instillation of antiseptic solutions and antibiotics has a limited value, which becomes less and less in the more chronic cases. The same applies to antibiotics given intramuscularly or orally.

The author discusses the role of allergy in many of these cases and the relationship of dental pathology to antrum infections. These are adequately covered in classic fashion.

DeReynier [113] comments on the frequency of maxillary sinus infection as evidenced by statistics cited, showing from 49 to 65% incidence in a series of routine autopsies in tuberculous, cardiac, and pulmonary fatalities. He divides the infections into two groups: the latent, or hyperplastic, and the exudative. The former is characterized by increase in the deeper connective tissue elements, zones of hyaline degeneration, and infiltration with lymphocytes and plasma cells. The exudative type is marked by extensive fungoid lesions, loss of epithelium, areas of necrosis, and degeneration with massive infiltration of polymorphonuclear leucocytes. The well-known symptoms and diagnostic procedures are described. Stress is laid on the value of contrast media for better visualization of the contents of the sinus in the x-ray pictures, and a number of illustrative cases are cited with accompanying x-ray visualization.

Pang,[114] reviewing the literature on air embolism following irrigation of the maxillary sinus, found a mortality of 39.5% in 58 cases studied. In the two cases reported by the author, both of which were fatal, the autopsy findings were different. The first case was complicated by the fact that the patient fell off the cart as he was being transported to the hospital, suffering from a brain injury. Autopsy revealed cerebral congestion and edema, extravascular hemorrhage in the left temporal lobe and motor cortex, pulmonary congestion, etc.

In the second case the autopsy showed edema of all the lobes of the lung and areas of consolidation. The trachea and bronchi contained blood. The brain showed discolored areas in the pons and midbrain.

The symptoms coming on overwhelmingly and with dramatic suddenness should not be confused with those arising from cocaine sensitivity, which in most cases is manifested by giddiness, fear, anxiety, palpitation, pallor, rapid thready pulse, and nausea. Only in very severe cocaine reactions does one observe convulsions, which are quite common in air embolism.

The author advises against the instillation of air at any time, either before or after the irrigation.

Merideth [115] presents a routine review of the sinuses, covering the essential points in anatomy, histology, and clinical signs of involvement.

KARTAGENER'S TRIAD

The following concise and informative article on Kartagener's syndrome appeared in the *Journal of the American Medical Association* [116]

Since the triad of situs inversus, bronchiectasis, and chronic sinusitis, which is known as Kartagener's syndrome, was first reported in 1933, 41 cases have been described in the medical literature. The lesions found in the nasal cavity and paranasal sinuses of patients with Kartagener's syndrome are of a variable nature and include mild or severe sinusitis, nasal polyposis, and hypoplasia of the sinuses. According to Kartagener and Ulrich, the simultaneous occurrence of bronchiectasis and sinusitis indicates a coordinated constitutional factor in the paranasal sinuses and bronchial tree that is presumably responsible for localization of infections. The incidence of bronchiectasis is significantly greater in persons with transposition of the viscera than in the general population. Olsen describes 14 cases (14.5%) in 85 patients with dextrocardia observed during a 27 year period, 10 of the 14 having nasal polyposis. Katz and his associates assert that the increased incidence of bronchiectasis among persons with situs inversus suggests a congenital factor in its pathogenesis. Whether a congenital predisposition or defect is an absolute prerequisite to the development of bronchiectasis is questionable, although it is apparently an important factor in some instances.

Whereas Cockayne interprets situs inversus as being dependent on a single autosomal recessive gene, this concept is disputed by Torgersen, who maintains that transposition of the viscera is occasionally inherited as a dominant character, occasionally as a recessive one, and in many cases is not at all hereditary. He regards the predisposition to disease of the nasal cavity and bronchi among patients with situs inversus as hereditary and probably caused by multiple genetic factors. Finally, persons with situs inversus, especially those with concomitant paranasal sinus infection, should be thoroughly investigated for bronchiectasis, while the families of patients with Kartagener's syndrome should be screened to determine the presence or absence of similar abnormalities.

Ferrand and associates [117] found three typical cases of Kartagener's triad in a series of six patients with situs inversus. All six cases are described in detail. Among these patients there was no evidence of any other congenital anomaly, excluding those involving the respiratory tract. Agenesis of the frontal sinuses was observed

in four of the cases, and in the other two there were evidences of some sinus pathology. Commenting on the bronchiectasis that was present in all the patients, the authors feel that the persistent sinus infection inducing bronchial infection secondarily could be considered the etiologic factor in the development of the bronchiectasis. They do not feel that the latter can rightfully be ascribed to the congenital anomaly.

Karani [118] found two cases of Kartagener's triad in sisters, one aged 29 and the other 41. There was a family history of chest trouble, and the father had been told that his heart was on the wrong side.

Both of the women were undersized, weakly, and subject to chronic cough. Bronchiectasis was diagnosed by x-rays, and the heart and liver were found to be transposed. Sinusitis was quite marked in the older sister but not evident in the younger, although the x-rays showed the frontals to be undeveloped.

The author quotes Adams and Churchill,* who stated that two types of people are affected by this condition: normal persons known as mutants and those in whom the abnormality is associated with other congenital defects, known as monsters.

The patients described by the author were both of small stature, with short limbs and small hands and feet; also they were of low mental capacity. The author considers them minor monsters.

Another case of Kartagener's triad is reported by Chatterjee in the *Indian Medical Gazette*.[119] The patient was a Hindu man aged 40, whose symptoms were cough and expectoration for almost seven years, with bouts of fever and pain.

Bronchography and x-rays revealed bilateral bronchiectasis and a situs inversus. X-rays of the sinuses showed absence of the frontal sinus and blurring and thickening of the walls of the maxillary sinuses.

Teixeira, Vaz, and Costa [120] report a case of Kartagener's syndrome in a 15-year-old girl. She had had a chronic cough with profuse expectoration and symptoms of chronic sinusitis for years. X-rays revealed complete inversion of the heart and abdominal viscera, a marked bronchiectasis affecting mainly the right lower lobe, and hypoplasia of the sinuses. Both antrums had been previously operated upon.

A lobectomy was successfully performed, which afforded much relief. Histologic examination of the excised lung failed to reveal any congenital abnormalities in structure, although it showed the usual pathologic changes associated with bronchiectasis.

FRONTAL AND SPHENOID SINUS DISEASE

A report by Hlavacek [121] concerns two cases of Hand-Schüller-Christian disease, in which histiocytoeosinophilic granulation tissue developed in the temporal bone. The first case was in a 4-year-old child, who had an eosinophilic granuloma in the hard palate and the gums, histologically confirmed. Later, foci appeared in the tibia and auditory meatus, where an ulcer was seen on the posterior wall. From there the process extended into the mastoid. At operation, granulations and pus were found in the mastoid, extending to the labyrinthine capsule, with erosion of the horizontal canal and facial canal.

The other case was in a patient aged 8 years with exophthalmos and foci in the skull. A polyp was present on the posterior meatal wall, which was removed, revealing histiocytic eosinophilic granulation tissue with lipoids. The process yielded to x-ray therapy.

* Adams, R., and Churchill, E. D., cited by Karani.[118]

Ballenger and Ballenger [122] conducted experiments on 15 dogs for the purpose of determining what happens to air and gas trapped in the frontal sinus. The nasofrontal ducts were occluded by pressure of a pack introduced through a hole drilled in the bony wall without perforating the mucosal lining. Observations of air pressure in the sinus were made by a manometer through a second hole directly into the sinus cavity. The results in more than half the cases showed an average negative pressure of 20.67 mm. of water after the initial rise had passed over. The rate of absorption was not as rapid as that which occurs in the lungs following occlusion of the bronchus, and is affected by factors such as temperature, thickness of the mucosa, and degree of vascularization. The results of the experiments would seem to prove that a negative pressure can develop in a sinus when the duct is blocked but that the rate is slower than anticipated and may be affected by the factors just mentioned.

The two cases reported by Moore and Carr [123] demonstrate the variability in the signs and symptoms of hyperostosis frontalis, often requiring a period of years of observation to establish the diagnosis. In one case a woman of 22 was observed for 22 years, during which time the thickening of the orbital plate lessened materially, whereas the bony thickening throughout the entire cranial vault increased to a marked degree. At no time was there any alteration of the sella turcica.

The other case was in a woman of 55, whose symptoms came on at the menopause with headaches, psychic manifestations, obesity, and an enlarged balloon-type sella.

Montgomery,[124] discussing various phases of sphenoid sinus disease, states that diagnosis can usually be made through inspection with the nasopharyngoscope and good x-ray films with contrast media. The latter adjunct will usually furnish all the necessary information in the mentovertex and lateral projections.

Irrigation of the sphenoid sinus should be possible in all cases unless access is barred by a septal deviation or too large a middle turbinate. Surgery is seldom necessary except in cases of retrobulbar optic neuritis, increased intracranial pressure, or meningeal irritation.

Three cases are reported in which relief was obtained solely through conservative measures.

ALLERGY—HEADACHE—FRACTURE—FOREIGN BODY—MISCELLANEOUS

Hansel [125] divides inflammatory diseases of the sinuses into three groups, namely, infections, allergies, and combinations. Diagnosis is important and depends on the correlation of the following items: clinical history, local examination, cytology of secretions, bacteriology, x-rays, and pathologic examination of tissues.

The author discusses the therapy, based on the foregoing, under three headings: local and surgical, antibiotic, and allergic. The last named includes immunization against infection or allergy and the use of hormones, such as cortisone, thyroid extract, etc.

Experimenting with various vaccines has resulted in the conclusion that Staphylococcus toxoid, given intracutaneously in small doses (0.02 to 0.1 cc.), will yield the best results. At times this is combined with mixed respiratory vaccines in dilutions of 1:1,000 to 1:100,000 or A and B virus vaccines, 1:1,000 to 1:100,000. If molds are found in the secretions, he recommends extracts of trichophytin, oidiomycin, and epidermophytin in dilutions of 1:100,000 to 1:100,000,000.

If the allergic factor is predominant, Hansel suggests desensitization with dilutions of from 1:100,000 to 1:1,000,000. These also are given intracutaneously.

Gale [126] describes two cases in which headaches attributed to sinusitis were found to be due to anxiety neuroses, after careful investigation of the personal history.

The author believes that less than 10% of patients complaining of sinus headache have causative sinus pathology. Psychologic as well as somatic methods of examination must be employed in all such cases.

Typical rhinogenic headaches, according to Moreau,[127] may be due to a vacuum sinus, septoturbinal contact, or a purely congestive state in the region of the middle turbinate. Eight cases of the usual type are cited. The author stresses the importance in all cases of eliminating cardiovascular, gastrointestinal, and other constitutional disorders before ascribing headaches to intranasal causes.

Therapy in the types he describes consisted of decongestive agents and minor surgery to correct anatomical abnormalities.

White and Anderson [128] report a case in which a 34-year-old man complained of pain under the eye when closing the lid firmly. He gave a history of having been hit over the temple six months previously with a glass bottle. He was unconscious for a short time but recovered promptly at the time the original laceration was repaired. The pain under the eye persisted, which led to an ophthalmologic examination, which revealed a tender area under the eye and a small firm round scar 3 mm. below the infraorbital ridge. X-rays showed a metallic object in the antrum, which, on removal, proved to be a rusted knife blade. It had apparently been thrust through the angle of the lateral and superior orbital margin, penetrating through the orbit into the left antrum.

Becker [129] describes a method of reducing depressed fractures of the zygoma by means of a metal spring inserted into the antrum, exerting continuous pressure against the fragment so as to gradually force it back into normal apposition. The material used is called Supramid, a synthetic superpolyamide made by the Baden Anilin and Soda Company, of Ludingshafen, Germany. The metal, measuring 2 mm. in thickness, is cut to a length of from 4 to 7 cm., depending on the depth of the antrum or the distance from its floor to the level desired for the repositioned bone. The procedure is especially useful in older fractures, which are usually difficult to reduce and maintain. The constant pressure of the spring action of the metal strip will force the fractured fragment back to normal alignment. Pressure necrosis has not been observed, and the metal may be left in place indefinitely or removed at any convenient later date.

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Boston 18

Microtone Models T-10 & T-612
Mfr., The Microtone Corporation
758 S. Mississippi River Blvd.
St. Paul 1

Normatone Model C

Normatone Model D-53
Mfr., Johnston Hearing Aid Mfg. Co.
708 W. 40th St.
Minneapolis 8

Distr., Normatone Hearing Aid Co.
22 E. 7th St.
St. Paul 1

Otarion Models B-15 & B-30

Otarion Models F-1 & F-3

Otarion Model H-1, Custom "5"
Mfr., Otarion, Inc.
185-7 Ashford Ave.
Dobbs Ferry, N. Y.

Paravox Model D (Top-Twin-Tone)

Paravox Model J (Tiny-Myte)
Mfr., Paravox, Inc.
2056 E. 4th St.
Cleveland 15

Radioear Model 62 Starlet

Radioear Model 72

Radioear Model 82 (Zephyr)
Mfr., E. A. Myers & Sons, Inc.
306 Beverly Rd.
Mt. Lebanon
Pittsburgh 16

Distr., Radioear Corporation
306 Beverly Rd., Mt. Lebanon
Pittsburgh 16

Silvertone Models H-16, J-92, & P-15
Mfr., Johnston Hearing Aid Mfg. Company
708 W. 40th St.
Minneapolis 8

Distr., Sears, Roebuck & Co.
925 S. Homan Ave.
Chicago 7

Solo-Pak Model 99
Mfr., Solo-Pak Electronics Corp.
Linden St.
Reading, Mass.

Sonotone Models 910, 920, 925, 940, 966, 977, & 988
Mfr., Sonotone Corporation
Elmsford, N. Y.

Televox Model E
Mfr., Televox Mfg. Company
1307 Sansom St.
Philadelphia 7

Telex Models 99, 200, 300-B, 400, 500, 952, 953, & 1700
Mfr., Telex, Inc.
Telex Park
St. Paul 1

Tonamic Model 50
Mfr., Tonamic, Inc.
12 Russell St.
Everett 49, Mass.

Tonemaster Cameo Model
Mfr., Tonemaster, Inc.
400 S. Washington St.
Peoria 2, Ill.

Unex Midget Models 95 & 110

Unex Models 200 & 230
Mfr., Nichols & Clark
Hathorne, Mass.

Vacolite Models J & J-2
Mfr., Vacolite Company
3003 N. Henderson St.
Dallas 6, Texas

Zenith Miniature 75

Zenith Model Royal

Zenith Model Super-Royal

Zenith "Regent"
Mfr., Zenith Radio Corporation
5801 W. Dickens Ave.
Chicago 39

(All aforementioned hearing aids have vacuum tubes.)
Accepted hearing aids more than five years old have been omitted from this list for brevity.

Transistor Hearing Aids Accepted

Acousticon Model A-300	1 transistor and 2 tubes
Acousticon Model A-310	1 transistor and 2 tubes
Acousticon Model A-330	3 transistors
Acousticon Model A-335 Mfr., Dictograph Products Inc. 95-25 149th St. Jamaica 35, N. Y.	3 transistors
Audivox Model 71 Mfr., Audivox, Inc. 123 Worcester St. Boston 18	3 transistors
Beltone Concerto Model Mfr., Beltone Hearing Aid Co. 2900 W. 36th St. Chicago 32	3 transistors
Maico Transist-Ear Model O Mfr., The Maico Company, Inc. 21 N. 3rd St. Minneapolis 1	3 transistors
Micronic "All American" Hearing Aid Mfr., Audivox, Inc.—Successor to Western Electric Hearing Aid Division 123 Worcester St. Boston 18	3 transistors
Microtone Model T1 (Red Dot)	3 transistors
Microtone Model T1 (Yellow Dot)	3 transistors
Microtone Model T31 (Micro-Mite) Mfr., The Microtone Corporation 758 S. Mississippi River Blvd. St. Paul 1	1 transistor and 2 tubes
Otarion Model C-15	1 transistor and 2 tubes
Otarion Model D-1	3 transistors
Otarion Model F-22 Mfr., Otarion, Inc. 185-7 Ashford Ave. Dobbs Ferry, N. Y.	1 transistor and 2 tubes
Radioear Model 820 Mfr., E. A. Myers & Sons, Inc. 306 Beverly Rd. Mt. Lebanon Pittsburgh 16 Distr., Radioear Corporation 306 Beverly Rd. Mt. Lebanon Pittsburgh 16	3 transistors

Sonotone Model 1010	1 transistor and 2 tubes
Sonotone Model 1111 Mfr., Sonotone Corporation Elmsford, N. Y.	3 transistors
Telex Model 954	1 transistor and 2 tubes
Telex Model 956 Mfr., Telex, Inc. Telex Park St. Paul 1	3 transistors
Unex Model TR-3D Mfr., Nichols & Clark Hathorne, Mass.	3 transistors
Zenith Model Royal-T	3 transistors
Zenith Model Super Royal-T Mfr., Zenith Radio Corporation 5801 W. Dickens Ave. Chicago 39	3 transistors

Semiportable Hearing Aids Accepted

Ambco Hearing Amplifier (Table Model)
Mfr., A. M. Brooks Co.
1222 W. Washington Blvd.
Los Angeles 7

Aurex Hearing Aids (three types)
Mfr., Aurex Corporation
1117 N. Franklin St.
Chicago 10

Precision Table Model Hearing Aid
Mfr., Precision Hearing Aids
5157 W. Grand Ave.
Chicago 39

Sonotone Professional Table Set Model 50
Mfr., Sonotone Corporation
Elmsford, N. Y.

Society Transactions

AMERICAN OTORHINOLOGIC SOCIETY FOR PLASTIC SURGERY, INC.

Harry Neivert, M.D., *President*

Louis Joel Feit, M.D., *Secretary*

Midwinter Meeting, Boston, March 27, 1954

The Management of Cleft Palate Cases Involving the Hard Palate, so as Not to Interfere with the Growth of the Maxilla. DR. FRED SQUIER DUNN, New York.

Dr. Dunn, as well as other surgeons, for years has operated on children with cleft palate at the age of 3 or 4 years according to the method of Dr. von Langenbach, of Germany. Everyone was happy because the palate stayed closed, and felt that a useful job had been accomplished.

Dr. Dunn interested himself in the follow-up of these cases for years afterward and was appalled at the end-results in these children later in life. There resulted an interference with the growth of the maxilla; there were years of work with the orthodonist and psychiatric care in an attempt to stabilize these unfortunate people.

He therefore set out to employ techniques designed to give these children at the time of operation a method which would not only close the palate but prevent maldevelopment of the jaw so that they would grow up with a normal appearing face and dental arch. The procedure was designed to give them a broad palate as well as a normal palatal roof, to give a normal bed for the tongue.

The von Langenbach procedure consisted of creating a raw surface on the split edges of the palate, which was undermined, and the raw surfaces were brought together. In this way, scar tissue was introduced, which prevented proper growth of the palate from its centers of ossification. Slides were shown of a number of cases operated on by the early technique, in which all the tissues of the face developed normally except the upper jaw, which in contrast was a small, underdeveloped part of the face. The normal-sized teeth attempted to grow into a space which will accommodate only one-half their number. Many teeth for this reason had to be pulled by the dentist.

Dr. Dunn's procedure was merely to freshen the edges of the palate and obtain flaps from the vomer. He classified his cases into three groups: (*a*) those in which the vomer is attached to one side of the palate; (*b*) those in which the vomer is not attached to either side but protrudes sufficiently into the mouth so that a flap can be taken from either side to cover the defect; (*c*) those in which the vomer is not attached and does not protrude sufficiently to reach the level of the defect. The latter are the most difficult to correct. Slides were shown of the operation and the results in cases.

DISCUSSION

DR. ROSEDALE called attention to the fact that there are two schools of thought on the cleft-palate problem. The surgical school, which, like Dr. von Langenbach, looks upon the anatomic architecture of the condition with the objective of closing an opening, is one school. The other school is concerned with the physiologic, psychologic, and social aspects of the problem. The latter necessitates the cooperation of various persons or groups to help solve the many problems which arise. He agreed with Dr. Dunn on many points. Dr. Rosedale believes that scarring is an important factor in the causation of maldevelopment as well as the interference with the circulation by traction on the blood vessels supplying nutrition to the parts. Too early operation, within the first few days or weeks of life, is also a cause of deformity. He also feels that two-stage or three-stage operations are safer than a single procedure. In many instances, the vomer is so high that it is impossible to tease down a flap. He regrets that more are not acquainted with Dr. Dunn's work and feels that if the surgeons do not produce better results, the other groups will take over and handle the patients on a medical basis, with the detriment to the patients.

DR. DOUGLAS PARKER has done cleft-palate surgery for many years as well as having observed work in many clinics. He was unhappy upon seeing the many mutilations which have been inflicted on patients by the uninitiated in this work. He agreed that the scar tissues

formed following operations are largely the cause of deformities. Too early operations to prevent psychological trauma on the "parent" were also a cause of the poor results. He objects to early operations, because of interference with growth and the development of the teeth. He believes that it is wrong to operate on a completely cleft palate before the eruption of adult deciduous teeth. To do so impedes the growth factors. When Dr. Parker looks back at the days of his early training, he shudders at the poor results then obtained in the clinics. Malocclusions and bad deformities followed such procedures as wiring the maxillae through and through and pulling these together. His own operations are more radical than the von Langenbach, but he is careful to choose the proper age of the patient in which to operate as well as preserve the circulation. He goes back into the pharynx to obtain proper tissue reposition and has had excellent results (some of his patients are actors on the stage as well as singers). He prefers to operate on patients in their teens, when there is better development and better tissue with which to work. He emphasized the imporance of speech and also mentioned the difficulty in bringing down flaps from a high vomer. Multiple-stage operations are sometimes necessary.

DR. DUNN, in closing, stated that the cleft-palate clinics are necessary for the deformed patients but believes that proper surgery permitting the development of speech would in time obviate the necessity of these clinics. It is speech that the patients need, not psychotherapy. He also emphasized the necessity of conserving the blood supply but feels that age is too important if the operation does not interfere with proper development.

Surgical Management of Complete and Incomplete Bony Atresia of the Posterior Nares. DR. HENRY BEINFIELD, Brooklyn.

After reviewing various techniques employed in correction of this condition, Dr. Beinfield stated that embryologically atresia is supposed to be due to the persistence of the bucconasal membranes, with a mesodermic layer between the two membranes. The mesodermic layer later develops to form the bony portion of the atresia. This means that the atresia in infants is membranous and not bony, as reported in some cases. Dr. Beinfield presented his own technique.

He stated: "The initial incision of the operation is made as far forward as possible, because the innermost depth of the nose cannot be approached in any other way. No technique that I know of has ever made use of the floor of the nose as a means of access to the posterior nares." These two points are the basis for the atresia operation to be described.

This operation for the correction of a bony atresia of the posterior nares is very simple to perform. Its use is primarily limited to the older child or adult; a different technique is used for the infant. A good headlight is necessary for proper illumination. Any mucus in the nose is removed before beginning the surface anesthesia. Pledgets of cotton soaked with 2% tetracaine (Pontocaine) hydrochloride or equal parts of 10% cocaine and epinephrine (Adrenalin), 1:1000, are then placed in the nose—one pledget being placed against the septum, another on the floor of the nose, and a third against the inferior turbinate. These are allowed to remain in place for a few minutes and are then removed. The nasal mucosa is then well infiltrated with 1.5% butethamine (Monocaine) and epinephrine, 1:30000, in the same manner as for a submucous resection of the septum. The injection is best started on the floor of the nose anteriorly, carrying it to the nasoantral wall and then onto the lower half of the septum. The posterior part of the nose is also thoroughly infiltrated. If the infiltration is made deeply, elevation of the mucous mebrane will be greatly facilitated.

After the anesthesia has been completed, it is very important to fracture the inferior turbinate upward, so that its inferior border assumes the position of a superior border. This procedure increases the working area in the lower half of the nose by taking advantage of the space normally occupied by the inferior turbinate. A U-shaped incision is then made, starting it along the floor of the nose, just behind the anterior edge of the maxilla, carrying it down to the bone and then up the nasoantral wall to the attachment of the inferior turbinate on one side and onto the lower half of the septum on the other side.

The mucoperiosteum elevates far more easily when the incision is started on the floor of the nose. Here, it readily finds the line of cleavage for the elevation of the mucosa on the septum and the lateral wall. A sharp septal periosteal elevator is used for the elevation, closely hugging the bone while extending the elevation to the back of the nose until the bony atresia is reached. The danger of perforation is practically nil. There is little or no bleeding during the operation.

After the nasal mucous membrane has been elevated, a long-billed Killian nasal speculum is introduced between the elevated nasal mucosa and the bone on the floor of the nose, vomer, and nasoantral wall. When the Killian speculum is widely spread, the bony portion of the atresia comes into view and is visualized in its entirety. If the atresia is completely bony, the entire posterior choana will be seen to be closed by only bone. However, if the atresia is incompletely bony, the amount of bone present to be exposed is less, and its exposure therefore is limited by the remaining membranous portion of the atresia, which closes off the rest of the choana.

In the completely bony atresia, the bone is freed from its attachment with a No. 10 gouge on a level with the floor of the posterior choana, the septal side, roof, and lateral wall. By tapping the gouge lightly until the sense of resistance is lost, one can prevent the danger of perforation.

The same procedure is followed for the incompletely bony atresia, except that there is less bone present to free. After the bony portion is separated from its attachment, it is easily peeled off the pharyngeal mucous membrane with a periosteal elevator or bayonet forceps. At this stage of the operation, a new bare bony rim is created, which will eventually be the permanent natural opening. The posterior choana is now thoroughly clear of any bone but is still completely closed by the pharyngeal mucous membrane present.

To produce the final opening in the completely bony atresia type, the pharyngeal and nasal mucous membranes are each treated separately. This is accomplished by first removing a circular portion of the pharyngeal mucous membrane with a No. 11 Bard-Parker blade, leaving a small rim of mucosa around its circumference, overhanging the newly created bare bony rim. When doing this, one must take care to protect the posterior pharyngeal wall from injury with the knife by keeping the finger in the nasopharynx against the opening closed by the pharyngeal mucosa. The Killian speculum is then removed, and the previously elevated nasal mucosa is returned to its former place on the septum, floor of the nose, and nasoantral wall. The replacement of the nasal mucosa again closes the posterior nares from the nasal side. A circular portion of the nasal mucosa is also removed, similar to that removed from the pharyngeal mucous membrane.

This last procedure completely opens the posterior choana, leaving two circular strips of mucous membrane overhanging the newly created bony rim, one on each side of it, with their raw surfaces facing each other. When these membranes heal together, this newly created natural opening becomes completely covered by its own nasal and pharyngeal mucous membranes, thereby preventing it from closing. Either membrane alone could also accomplish the same purpose. In the incompletely bony atresia, the membranes are practically one and are handled as such. In this instance, the circular portion of membrane is removed from the entire thickness of the membranous atresia. The remaining rim of mucous membrane around the newly created opening can be incised in a stellate fashion, or it can be left alone. After the placement of a postnasal pack, a piece of rubber tubing is then passed into the nose by way of the nasopharynx, to insure that the raw surfaces of the two mucous membranes are approximated around the bare bony rim. Since the posterior naris is two and one-half times as large as the anterior naris, the diameter of the tubing used should be about twice the size of the opening of the anterior naris.

The presence of the rubber tubing in the nose does several things. It exerts pressure against the replaced elevated nasal mucous membrane on the floor of the nose, nasoantral wall, and septum, eliminating the possibility of any dead space; it prevents the formation of a hemotonia and minimizes the possibilty of any postoperative bleeding. In the infant, a crucial incision can be made in the posterior naris and a rubber catheter placed through it. The rubber tubing is removed from five days to a week after operation, with no further treatment necessary. The previously fractured inferior turbinate returns to its normal position after the tubing is removed. A submucous resection can be performed at the same time, if necessary.

The operation described is simple, effective, and nondestructive. It is surgically, anatomically, and physiologically correct in every way, creating, as a final result, a permanently patent natural-sized opening.

In conclusion, Dr. Beinfield added that the presence of a bilateral atresia of the posterior nares is frequently responsible for asphyxia in infants at birth. The unexplained cases of suffocation in infants up to 5 months of age found dead in their cribs or carriages may be due to a unilateral atresia when no other definite pathological cause is found at autopsy.

DISCUSSION

DR. ERSNER reported experience with 15 cases. He called attention to the fact that we must be guarded against asphyxiation, as some children have been considered "blue babies" on a cardiac basis. It was emphasized that the institution of artificial aeration is important. Mouth breathing is also a symptom, and which is difficult for babes to employ. Dr. Ersner used a long dental burr to open the obstruction, while one finger was used as a guide in the nasopharynx. He also used a rubber catheter to maintain the opening patulous and left it in for several weeks in some cases. It was drawn into the opening in a similar fashion that one draws up a postnasal pack in epistaxis.

Congenital Cleft Lip and Associated Nasal Deformities. DR. DOUGLAS PARKER, New York.

Cleft lip is seldom in midline. It is most often found on the left side and develops at the 9th and 10th week of fetal life. There is a distinct hereditary history. In experimental rats, a niacin deficiency has been associated with such clefts. Most bilateral clefts are complete and somewhat resemble the lip of a hare, hence the name harelip, which is a useless term. There is no such resemblance in most cases. Cleft lip is a better term.

In the bilateral cleft, there is usually a failure of union of the premaxillary segments of the embryo as well as the labial segments. This gives rise to a prominent prolabium, which is attached close to the nasal tip and practically displaces the columella of the nose, which is underdeveloped. The mucosa of the vestibule of this prolabium is attached to and contiguous to the mucosa covering the premaxilla. The premaxilla itself is usually anteriorly displaced out on the stem of the vomer and is generally movable with the vomer itself. This premaxillary segment contains the follicles of the deciduous central incisor teeth. Such a hideous deformity is very upsetting to the parents and presents a challenge to the surgeon who is going to undertake its correction.

These bilateral cases are the most difficult cases to correct, to secure the best cosmetic results, and often involve many operations spaced commensurate with the development of the anatomical parts. Most of the operative failures in cleft-lip surgery have, in the past, been associated with complete bilateral clefts of the lip and palate. The fact that the columella is underdeveloped makes the tip of the nose bound down to the lip as the result of the early lip repair and seems to inhibit much of the development of the prominence of the nasal tip and its supporting cartilage.

The deformities of the nose associated with cleft lip vary with the extent of the cleft in the lip. In the incomplete lip clefts which involve the lower half of the lip, there is rarely any nasal deformity. The size of the nose is normal, and the nose is generally in the midline of the face. Where the cleft is complete, however, the nose is generally markedly deviated to the side opposite to the cleft. There is often a deficiency of the lateral and alar cartilages of the cleft side, with a wide flattened ala and an absence of a floor of the naris on that side.

In a complete bilateral cleft of the lip, the nose is usually in the midline of the face but broad and flattened. This is frequently associated with a bilateral deficiency of the alar and lateral cartilages and a loss of columella development. The floor of the nares is absent or ununited. The vomer cartilage is horizontally elongated and supports the premaxillary segment of the maxilla. Some bilateral clefts of the lip are complete on one and incomplete on the other side. There may be a deviated nose in these cases, and it follows somewhat the pattern of the single incomplete cleft lip except that the columella is more apt to be underdeveloped.

Surgery is undertaken when the infant is in good shape nutritionally, usually between the third and sixth week after birth. Technique of correction of cleft lip is as follows: Incisions are made in the vestibule under the lip to undermine the lip and separate the ala on each side from its basal attachment to the bone, care being used not to go down to the bone and strip off the periosteum. The septal cartilage is freed from the nasal spine with a scalpel or sharp scissors. The undermining and relaxing of the tissues should extend laterally so that the nose can be moved without tension into the midline of the face. Much of the undermining can be done by blunt dissection, to avoid as much hemorrhage as possible. I cannot too strongly emphasize the importance of this relaxing of the attachment base of the alae and the nasal spine in these complete clefts of the lip because we see some of these cases in which the lip is just closed cosmetically and the nose is not interfered with. It makes a great deal of difference in the

appearance of a person with the nose badly out of line, and it means later that the operation to straighten that nose sometimes is delayed until early adult development has taken place. Usually it also means rhinoplasty or fracturing the nasal bones as well as replacing the cartilage. But if it is done in infancy, without disturbing too much of the periostium of the underlying bone, it can be done with apparently little or no harm to the developing infant. That I found out over the years.

The external plastic incisions through the skin and orbicularis oris muscle should be carefully planned beforehand. A modification of the Hagedorn operation, as described by Le Mesurier, of Toronto, seems to offer a most satisfactory method as it breaks the line of incision and brings the lower part of the scar into the midline of the philtrum and makes a lip-line "cupid's bow." This procedure minimizes the lower border contraction or notching so common in many of the poorly done lips. I have further modified this procedure by making my initial incision on the short side of the lip, under the ala of the nose, nearly horizontal so that in closing the nares the ala is rolled up by coapting this horizontal incision to a vertical incision on the opposite side of the cleft.

When the skin incisions through the full thickness of the lip are made in this procedure, the sum of the incisions in each side of the lip must be equal in order not to produce a distortion. This can be done by using a caliper and pricking the various points of the incision and marking these points with a blue stain. After one is proficient in this operation, it is not always necessary to use the calipers to judge the distances. Visualizing the geometric pattern at all times is, however, quite essential. For the coaptation of the flaps, I have used No. 0000 dermal non-absorable surgical (silk) sutures, carrying the fine curved needle well down into the center of the musculature of the lip before inserting the needle into the similar depth of musculature of the opposite side. That is a very important thing because so many coapt the skin in very small incisions, and the end-result, frequently, is a contraction in the cross section of the lip and a dipping down, so that a flat, smooth surface is not obtained. If you elevate the musculature, you get a much better flat surface to the skin coaptation.

Too many sutures should be avoided, but enough should be used to properly coapt the skin without separation. I usually remove every other suture on the third day and the remaining ones on the sixth or seventh day. If your original relaxing and undermining incisions have been adequate, there will be a minimum of tension on your lip at the suture line. No dressings are used on the incisions of the lip. After approximation, the skin at the suture line is painted with compound benzoin tincture, which makes an excellent protective covering. A Logan lip-bow is used with adhesive straps, to relieve the tension on the suture line and to act as a protective guard over the lip, as the child may turn or roll against his covering.

The bilateral cleft lip is more complicated. The greatest problem of the cleft lip lies in the management of the bilateral clefts so that the lip is of proper length and symmetry, the columella is lengthened, and the tip of the nose is raised and not bound down. The stabilization of the premaxilla is a problem that is not often accomplished. The next problem is the repositioning of the nose in the complete unilateral clefts, which, I feel, should be done when the lip is first corrected, as the septum and lateral alar cartilages are more amenable to movement. The modification of the Z plastic incisions and breaking the line of scar have contributed much to a more symmetrical and cosmetically acceptable lip.

Good cheiloplasty and rhinoplasty will go a long way in avoiding the psychic complexes in the patients when they reach a discerning age, and allow them to take their place in society with a minimum of embarrassment so that they can become normal and useful citizens.

DISCUSSION

DR. SAMUEL SEGAL: My experience was mostly with adults. In the past poor results ensued because of the following:

1. Cicatrical contraction of the raw surface consequent to the undermining
2. Distortion and trauma to the lower lateral cartilage from tension suture
3. Displacement of the septum from the midline, also resulting from use of the tension suture
4. Surgical trauma occurring in infancy, causing interference with growth centers

My own procedure consits of two stages. They are as follows:

Stage 1. In most cases, I find that it is necessary to perform a rhinoplasty with appropriate septal correction prior to correction of the congenital deformity. During the rhinoplasty the primary intercartilaginous incisions are difficult to make, particularly through distorted nares; therefore, the incision is made easier by previously severing the distorted ala at the ala-facial groove.

The rhinoplasty having been completed, the uninvolved ala is now severed also at the ala-facial groove. In order to lengthen the congenitally short columella, the original transfixion incision is carried downward and laterally on either side of the columella onto the floor of the nose, to meet the previous ala-facial incision. This helps to convert the lip into a mobile flap and permits one, with proper suturing, to lengthen the columella at its base at the expense of the lip. Parenthetically, this reverses the situation so that now the columella gains that which was taken from it and incorporated into the lip in previous attempts to repair the cleft.

Through the floor incisions, the lip is raised from its premaxillary attachment. Care must be taken during this separation not to perforate the mucosa on the underface of the lip. Through this premaxillary incision a pocket is made in the lip, and a flat piece of septal cartilage is placed in situ. This serves to give the lip both firmness and projection.

Further correction of the collapsed alar is made by introducing a thin, flat piece of septal cartilage into a fashioned pocket. In a similar manner, a pocket is made in the columella, and a "batten" is inserted and sutured into place to help maintain the rigidity of the columella and also to give more projection and rigidity to the tip of the lobule. With this columella batten serving as a prop and as an axis of rotation, the whole tip can be rotated manually and placed in the midline. The columella is then sutured to the membranous septum. When this is completed, the ala on the uninvolved side may be shortened at this time to equal the length of the opposite ala. Both are then reattached to the cheek.

Stage 2. If the lip procedure is not likely to consume too much time, the second stage can be carried out at the same operation, otherwise I usually wait about six weeks.

DR. ROSEDALE: Dr. Parker, what is the youngest age at which you do a cupid's bow operation? I also would like to know if remodeling the lower lateral cartilages interferes with growth.

DR. PARKER: In answer to the first question, I would say that if this is a secondary operation, I would do it as soon as circulation is established. I would prefer, however, to wait until the patient is of school age.

DR. FEIT: How do you manage postoperative keloid formation? How do you manage deflection of the lower cartilages? Do you try to restore the vomer into midline?

DR. PARKER: I do not worry about the vomer much. Occasionally, it may be pushed in place. Never remove any of it. A deviated septum may have to be corrected later but not during early childhood. As to keloids, I wish I had an answer. They usually occur in the darker pigmented races. X-ray has been used. Excision has been used, but recurrence is the rule.

DISCUSSION OF PROBLEMS

DR. ERSNER (Presiding): The next part of the meeting will be devoted to a discussion of problems. We will ask Dr. Bolotow to act as moderator.

DR. BOLOTOW: I am not here to answer your problems. I am here to have you present your own problems and answer them yourselves. There is no prescribed panel on this discussion, no special topics, and no prepared subjects. Every one in the room is on the panel.

I feel that the nicest way to learn something is to have a real informal discussion—make it sort of a jam session. If you have a problem, get up and state it. If there is anyone in the audience that can answer it, I wish that he would get up and answer it. If you have a problem that troubled you considerably in the past and you found an answer to and solved it, it would be nice if you would get up and give the rest of us your experience. Now when you get up, please mention your name.

DR. GORNEY: I would like a discussion of a lesion on the lower lip involving the vermilion border and the mucous membrane of the mouth. I want to know how to handle this. I have such a case in a 19-year-old girl, who is worried about the condition as well as the results of surgery.

DR. ROSEDALE: I would remove the lesion of the vermilion border and cover it by bringing the mucous membrane over from the mouth.

DR. BOLOTOW: I would like some discussion on the sandpaper treatment of the skin for scars.

DR. NEIVERT: I have had a little experience and favor the Kurtain technique, i. e., freezing with ethyl chloride and using a rotary abrasive on an electric drill.

DR. PARKER: Dr. Iverson first advocated the technique for acne scars. It should not be used in the acute stage of acne. Dr. Iverson originally advocated using the sandpaper wrapped around a gauze bandage, about 3 in. (8 cm.), and he used it entirely by hand, with the sandpaper wrapped around there to work it.

The men who are using it now sometimes are using a dental engine with a revolving disk of sandpaper. That has some advantages and many disadvantages. The disadvantage is that it is travelling at high speed: one can cut deeper than through the three layers of the skin and produce a scar. If you cut too deep, you can produce another scar. That is a problem as well.

The latest technique is using a rotating wire brush in a rotating engine, but one has got to have a sense of touch. You have got to do so much and not any more. One of the dangers of the sandpaper has been that some of the abrasive material becomes incorporated in the skin. It has got to be scrubbed afterward, to scrub out all the abrasive materials.

Another problem that comes up is the problem, as many have reported it, of having little cysts in the skin through the implantation of epithelial cells in the deeper structures. If the abrasive material becomes walled off, it may produce a little cyst.

On the other hand, the abrasive will produce a new epidermis, and it does work very nicely in selected cases. I have used it in taking out some small pits and scars, and some are using an abrasive technique when they are doing an original operation on the skin, a plastic operation. They are abrading the surface where coaptation of the skin takes place. I have not done that, but I have heard of several who are using that now and abrading the surface that they are coapting. I cannot see a great advantage in it, but it has much to commend it if it is used carefully, but a rotating brush at high speed or a rotating disk at high speed can cut in. Anyone who has ever used a large sandpaper disk on furniture knows that you can dig in and get quite a deep circle where the edge dips in a little bit with more pressure, and you can produce a scar that is unsightly as a result. It is something you have got to use with a good deal of caution.

I believe that Dr. Iverson was quite correct in his hand pressure. He did not do too much damage in having the sandpaper wrapped around a little gauze bandage. I feel that there is a refinement of technique that can be worked out in having your particular abrasive that does not shed the abrasive material into the skin, but you have to wash it and scrub it to get all that out; otherwise, you are implanting foreign bodies of abrasives into the skin surface. It is almost like tattooing the skin, and if it is a type of abrasive that has any dark color to it, it is liable to give a tattoo mark as a result, if it is implanted in the epidermis.

DR. ARMSTEAD: There are a couple of practical things that sandpaper surgery has brought out. I have encountered them in trying to use the method. There is a rather prolonged period of erythema, which you must warn your patients about before using this method. These surfaces are quite like healing split-thickness graft donor sites, and they have an erythematous area that is rather unsightly, especially in exposed surfaces, for maybe two, three, four, or five months. You want to warn them about that. Sandpaper in itself is a rather misleading term. If you are going to do this operation, remember it is waterproof abrasive paper and not sandpaper that you use.

The usual thing that leads to poor results, as Dr. Iverson mentioned in his paper, was that you do not abrade deep enough, and I have found this to be true in many of the things I have tried. I have been much too gentle in my abrasions, and the lesion that I was trying to correct was there when I got through.

After further discussion, pro and con, of the technique of the treatment of skin scars, the meeting was adjourned. The next meeting is to be held in New York, Sept. 19, 1954.

Abstracts from Current Literature

Ear

Occlusion of the Round Window by Otosclerosis. J. R. Lindsay, Laryngoscope **64**:10 (Jan.) 1954.

Otosclerosis can involve the round window as well as the stapes. A case is presented in which most of the round window was so involved. If all of the window should become occluded, a hearing loss similar to that of stapes fixation would occur. Some means of differentiating the two conditions should be investigated.

Hitschler, Philadelphia.

Perceptive Deafness Treated with Vitamin B Complex and Amino Acids: 100 Cases. John H. Children, Laryngoscope **64**:120 (Feb.) 1954.

One hundred cases of perceptive deafness were treated with large doses of amino acids orally, vitamin B complex orally and parenterally, and histamine intravenously. They were also put on a diet rich in vitamin B. No improvement of hearing was noted, which was disappointing. However, there may have been a slowing of the progression of the deafness.

Hitschler, Philadelphia.

Modern Concepts in the Treatment of Otitis Media. Bernard Zonderman, New England J. Med. **249**:643 (Oct. 15) 1953.

The author discusses the treatment of otitis media from four viewpoints, the use and abuse of antibiotics, the importance of myringotomy, the significance of serous otitis media, and the problem of recurrences.

He points out that failures in the initial chemotherapy of otitis media are increasing, as well as the incidence of deafness and mastoiditis. The need for anatomic and physiologic knowledge of the hearing apparatus is greater in this antibiotic era, rather than less. It is emphasized by illustrative cases that the prevention of otitic complications and of chronic draining middle-ear infection is best accomplished by myringotomy early in acute suppurative otitis media and long-term, complete, and carefully observed antibiotic therapy.

Secretory nonpurulent otitis media is discussed in the light of its role in deafness, diagnosis, and proper definitive treatment.

Lastly, the problem of recurrent otitis media is discussed. Causes and various treatments of this condition are enumerated, and a description of adenoidectomy under direct inspection is given.

The author lends his support to those who condemn the use of throat lozenges and troches which contain insignificant amounts of antibiotic agents.

Wheelock, Denver [A. M. A. Am. J. Dis. Child.].

What Effect Does the Extirpation of the Temporal Lobe Have on the Cochlear and the Vestibular Function? J. S. Riesco MacClure, Rev. otorrinolaring. **13**:87 (Aug.) 1953.

MacClure had seven cases of psychomotor epilepsy, in five of which a temporal lobotomy was performed. However, a number of tumors were found in the pathologic examinations. Of the seven cases, three showed normal hearing postoperatively, and another three showed only a minimal change in the audiometric curve. MacClure concludes that complete ablation and destruction of the temporal lobe was compatible with normal hearing thresholds.

In another series of nine cases the vestibular responses were evaluated, and of these nine there was a total removal of the temporal lobe in six. Two showed a tumor, and one had a large abscess. Of the nine cases, six presented normal vestibular findings and three some abnormal findings, but these findings were rather inconsistent and lacked a definite pattern to establish

any particular diagnosis. In conclusion, MacClure believes that either the removal of the temporal lobe or the presence of destruction within the lobe does not present sufficient functional symptoms, either cochlear or vestibular, to make an accurate diagnosis of the lesion in the temporal lobe.

PERSKY, Philadelphia.

Pharynx

THE TONSIL PROBLEM IN THE ADULT. R. WALDAPFEL, Eye, Ear, Nose & Throat Month. **33**:27 (Jan.) 1954.

Waldapfel reviews the anatomy and physiology of the tonsils. He ascribes to the secondary nodules of the tonsils a defensive function, including the production of antibodies. The tonsils have been thought to be regional lymph glands to the nose, but this theory was discarded after it was proved that the tonsils have no afferent lymph vessels leading into them. Infections may, however, spread from the nose to the tonsils by way of the venous plexus of the pharynx, which communicates with the nasal turbinates and with the tonsils. This route may account for the development of "traumatic" tonsillitis following intranasal operations as well as provide the pathway for infection in epidemic tonsillitis or in tonsillitis following or combined with rhinitis. Infection of the tonsils may also be due to cryptal plugs blocking the natural path of exit for spent cells and bacteria in the tonsils.

There are marked differences of opinion in the role of the tonsils in focal infections. Similarly, there is confusion between the relationship between allergy and the tonsils, as hypertrophic lymphoid tissue so often accompanies allergy. Waldapfel believes that the tonsils have a function and therefore should not be removed indiscriminately. Hypertrophy of the tonsils, in itself, is no proof that the tonsils are infected, as they may become enlarged in their activity as the first line of defense in the upper respiratory tract. In this activity, however, they may become infected themselves, and a clinical sign of the infection is tonsillitis. Repeated spells of tonsillitis would indicate damage in the defensive mechanism and would justify their removal.

Waldapfel, therefore, believes that tonsillectomy is the best protective measure against recurrent tonsillitis and its complications. Tonsillectomy is also indicated when there is a definite connection between exacerbations of rheumatism, nephritis, and endocarditis and attacks of tonsillitis. Another indication for tonsillectomy is offensive breath due to the deterioration of the contents in the tonsillar crypts.

JENNES, Waterbury, Conn.

PEDIATRIC ASPECTS OF THE TONSIL PROBLEM. A. TOW, Eye, Ear, Nose & Throat Month. **33**:33 (Jan.) 1954.

Tonsillectomy and adenoidectomy should be performed only when there is a positive indication for the procedure. If the tonsils or adenoids are hypertrophied to the degree where they mechanically interfere either with deglutition or with respiration, they should be removed. Recurrent infection associated with the tonsils or adenoids is another positive indication for operation. This is especially true in a puny child who has failed to gain normally in weight. In those diseases in which the tonsils are condemned as a focus of infection, it is best to make a decision as to operation based on the appearance of the tonsils and on the history related to tonsillar infection. The decision in each case must be individualized. Tow believes that the removal of adenoids alone is justified in only the rare case. Tonsil and adenoid operations should not be performed during the months when poliomyelitis is prevalent. Although the incidence of poliomyelitis may not be greater in children who have had a tonsillectomy within two months of the disease, the bulbar form develops almost twice as frequently.

JENNES, Waterbury, Conn.

THE TONSIL PROBLEM IN THE ALLERGIC CHILD. L. S. NELSON and A. V. STOESSER, Eye, Ear, Nose & Throat Month. **33**:34 (Jan.) 1954.

In a discussion of this controversial problem, Nelson and Stoesser conclude that tonsillectomy should be performed in allergic patients only when positive indications exist for tonsil removal. If the tonsils are removed because of local disease of the tonsil and not in an effort to improve the allergy, the procedure will be beneficial to the allergic child. It should be performed only after

the underlying allergic process has been completely investigated and adequate treatment has been instituted. The operated on child must be maintained in good allergic control, because of the increased tendency for regrowth of lymphoid tissue in the presence of uncontrolled allergy.

JENNES, Waterbury, Conn.

BLOODLESS TONSILLECTOMY: A NEW OPERATIVE PROCEDURE. M. UNGER, Eye, Ear, Nose & Throat Month. **33**:38 (Jan.) 1954.

Unger describes a technique for tonsillectomy which, he believes, brings the operation into conformity with the principles and practice followed by surgeons in the removal of tumors in other parts of the body. His method utilizes a guillotine-type tonsillar instrument. This is applied to the tonsil, and after the tonsil is completely through the guillotine ring, the blade of the guillotine is firmly pressed home. The tonsillotome is then brought up to the vertical position and pulled to the other side, thereby stretching the tonsillar attachments. The widespread attachments of the tonsil have now been converted into a pedicle that can be ligated easily, which is the conventional method of preventing hemorrhage in general surgery. With the use of Unger's needle holder, two to four sutures are taken through this pedicle. The tonsil is then amputated on the distal side of the guillotine by the use of a tonsil separator with a serrated edge. The blade of the guillotine is then withdrawn and the stump of the tonsil released. The ligatures are then tied.

Unger believes that deep anesthesia and preoperative sedation predispose to hemorrhage. Relaxation of the muscles of the throat deprives the blood vessels of the constriction and support that the contraction of muscles affords. The drying effect of preoperative sedation diminishes the salivary secretions, which have a distinct coagulatory effect.

JENNES, Waterbury, Conn.

Larynx

DIAGNOSIS AND TREATMENT OF ENCRUSTATIONS IN THE TRACHEA. J. J. CONLEY, J. A. M. A. **154**:829 (March 6) 1954.

Encrustation of the trachea is discussed as a specific clinical entity in relation to tracheotomy. The association of this entity with radical surgery of the head and neck has given it added significance. The incidence of the condition and an analysis of the etiological factors indicate that the phenomenon develops from a composite situation associated with intrinsic biological factors and extrinsic physicoenvironmental factors. A careful evaluation of these factors mitigates the probability of crust formation. The importance of the effective control and treatment of this condition is emphasized by a shortened and improved convalescence and the diminution of the tragic danger of asphyxiation.

GORDON, Philadelphia.

METASTASIS OF MALIGNANT TUMORS OF THE LARYNX. JOHN R. HOUGHEAD, Laryngoscope **64**:50 (Jan.) 1954.

Five cases are recorded (from 1916 through 1951) of metastasis of malignant tumor of the larynx. Two cases were renal-cell carcinoma and three malignant melanoma. It is felt that the scarcity of metastasis to the larynx is due to the scarcity of tumor emboli reaching the larynx.

HITSCHLER, Philadelphia.

CONTACT ULCERS OF THE LARYNX. DANIEL C. BAKER JR., Laryngoscope **64**:73 (Feb.) 1954.

Contact ulcers are not common. They result from trauma (improper phonation). They must be distinguished from carcinoma and tuberculosis.

Treatment consists of vocal reeducation given by a competent speech teacher. Vocal rest alone will not suffice, as the condition will return as soon as the patient speaks again.

HITSCHLER, Philadelphia.

CANCER OF THE PHARYNGOLARYNGEAL GROOVE, WITH SPECIAL REFERENCE TO THE SINUS PYRIFORMIS. M. LEDERMAN, J. Laryng. & Otol. **67**:641 (Nov.) 1953.

A neglected anatomical area, namely, the pharyngolaryngeal groove, and its relation to the sinus pyriformis is clearly defined anatomically and its tumors classified. Prognostic and therapeutic reasons exist for dividing these neoplasms into an upper and lower group.

Dominant symptoms of upper and lower lesions are similar, but certain qualitative differences between the two groups do exist. Pain in the throat, dysphagia, and true hoarseness are more characteristic of lower lesions. The mirror appearance varies remarkably, deformity, displacement, ulceration, and loss of structure being more characteristic of upper lesions. Laryngeal fixation and lymph-node metastasis are commoner to lower tumors, and the former is practically never influenced by radiotherapy.

Clinical results based upon 318 pharyngolaryngeal neoplasms, of which 119 involved the sinus pyriformis, are discussed. Most of the cases in this series were far advanced at the time of diagnosis with a high incidence of laryngeal fixation and lymph-node metastasis, particularly in the lower group of tumors, and this accounts for the low over-all survival rate of 6.5%. However, the incidence of three-year survivals was surprisingly good. The better prognosis of upper and medial lesions as compared with the lower tumors is stressed.

Conclusions from this study are the following: (1) radiotherapy is the treatment of choice for tumors affecting the upper half of the sinus pyriformis; (2) surgery is the treatment of choice for lesions of the lower part of this region, and (3) radiotherapy is palliative in advanced cases.

LeJeune and Normann, New Orleans.

Discussion on the Keratoses of the Larynx. M. Black, B. T. Davis, and W. H. Bond, Proc. Roy. Soc. Med. **47**:245 (April) 1954.

The Section of Laryngology on Dec. 4, 1953, met under the presidency of C. P. Wilson, C.V.O., F.R.C.S., at a meeting of the Royal College of Surgeons. Mr. Munro Black, of Newcastle-upon-Tyne, said that hyperkeratosis is a condition of great chronicity and tenacity, which sometimes leads to carcinoma. Such a case may "go malignant" even under the watchful eyes of a laryngologist. However, seemingly such cases are becoming less frequent, probably due to better oral and laryngeal care and the rarity of a positive Wassermann reaction. All cases of dysphonia should be seen early and a careful past history taken. Irritation by cigarette smoke and industrial vapors is emphasized, as is the unreliability of diagnosis by x-rays save with regard to lung lesions. In middle or later life, the hormones may well play a part, especially in men, and in women the menopause must be considered. Black comments, "I have gained . . . an impression in my cases of thick-set, red-skinned people." There is dryness and redness of the mucosa of the pharynx and larynx. White plaques may even be seen on the vocal cords. He has had some encouraging results from vitamin A, given in dosage of 100,000 units a day. Taking a biopsy specimen is desirable under certain conditions. When local or ordinary remedies make no progress, irradiation or laryngectomy must prevail, since the change in the larynx may be a general and not merely a localized affair. Several figures in black and white are offered in support of seven case-history reports.

Continuing the discussion, Dr. B. T. Davis, of the Department of Pathology, University of Birmingham, described the pathology of keratoses of the larynx. He averred that the two terms keratosis and hyperkeratosis are fairly interchangeable save that the latter refers to a thicker layer of horn cells. Chronic hyperplastic laryngitis may be due to vocal abuse or over-indulgence in smoking or in drinking alcohol. Keratosis is frequently, but not always, present here.

Pachydermia of the larynx is likely to be at the posterior ends of the vocal cords. It must be distinguished from contact ulcer of the larynx.

Singers' nodules may show keratotic epithelium, but these are benign and seldom or never show malignancy. The same is true of multiple papillomata in children, which seem to follow virus infections.

Keratosis of any area may be precancerous, either intraepithelial or even invasive carcinoma. Leukoplakia of the larynx is undoubtedly precancerous. Something must be said, too, concerning vitamin deficiency, especially disturbances in vitamin-A metabolism, as a contributing cause. An American, H. B. Graham, is cited as of 1942, at which time he described the use of vitamins A, B, C, and D in a case of keratosis, followed by retrogression, disappearance of hyperemia, and nonrecurrence following surgical removal. However, as a general rule, all keratoses should carry a suspicion of possible malignancy.

Mr. W. H. Bond, of Queen Elizabeth Hospital, Edgbaston, Birmingham, recited his experiences with radiotherapy of hyperkeratosis. Good response to premalignant lesions is

possible, but in the presence of "change" (rapidly occurring) the most suitable cases are those in which the condition is cordal only, without fixation, and in which the blood supply seems good. There were about 12 discussants, whose opinions cannot be recorded here, but the meeting seems to have been spirited, comprehensive, and helpful.

I. W. VOORHEES, New York.

INCIDENCE OF TRACHEOBRONCHIAL TUBERCULOSIS. CESAR SILVA BRUM, An. oto-rino-laring. Uruguay **23**:103, 1953.

Brum makes an analysis of 100 cases of pulmonary tuberculosis. His findings are that with the use of antibiotics the incidence of tracheobronchial tuberculosis has markedly decreased. Secondly, when present, tracheobronchial tuberculosis recedes more rapidly under treatment with the antibiotics than do the pulmonary lesions. Thirdly, the use of the antibiotics has decreased the possible sequelae and stenosis. In this series of 100 cases, there were only two patients with this complication. However, lastly, Brum feels that care should be exercised in many of these cases, to study the bronchial involvement and also to evaluate those cases in which the patients have had extensive antibiotic therapy and have not done well due to a possible establishment of a resistance to this form of treatment.

PERSKY, Philadelphia.

Nose

BONE GRAFT FOR ATROPHIC RHINITIS. JOSEPH H. OGURA, Laryngoscope **64**:20 (Jan.) 1954.

Cancellous bone from the iliac crest is used as a septal graft to narrow the nasal passages in atrophic rhinitis. The results have been good in selected cases. The membranes assume a more normal color and appearance. An important factor in the taking of the graft is a properly prepared bed for the graft in the hard palate.

HITSCHLER, Philadelphia.

TEN YEARS' EXPERIENCE IN THE USE OF TANTALUM IN FRONTAL SINUS SURGERY. ROBERT L. GOODALE, Laryngoscope **64**:65 (Feb.) 1954.

In a not inconsiderable number of cases in which the Lynch operation had been performed for frontal sinusitis, there was a closing of the passageway from the sinus into the nose. Granulations and then scar tissue form to cause this closure. The use of tantalum foil in this area to prevent such closure is discussed. It is not used routinely but only in those cases in which stenosis is expected.

HITSCHLER, Philadelphia.

MALIGNANT MELANOMA OF THE NASAL SEPTUM. FRED ALEXANDER, Laryngoscope **64**:123 (Feb.) 1954.

This is the 25th reported case of malignant melanoma of the nasal septum. Such tumors are almost always associated with nasal polyps. They are very malignant and may metastasize anywhere.

Early radical excision is advised, but, even so, the mortality rate is high. Only one patient survived as long as seven years, and only 5% survived as long as two to five years.

HITSCHLER, Philadelphia.

A TECHNIQUE FOR CORRECTING A FLAT NOSTRIL IN CASES OF REPAIRED HARELIP. J. B. ERICH, Plast. & Reconstruct. Surg. **12**:320 (Nov.) 1953.

For the operation of correcting a flat nostril in cases of repaired harelip, Erich prefers thiopental (Pentothal) sodium with oxygen. The incision is made in the skin along the free border of the nares. When the defect is unilateral, the incision can include only the anterior part of the normal nostril but should extend to almost the full length of the lateral margin of the deformed side. Through this incision, the nasal tip is undermined with scissors or a double-edged scalpel so that when the skin is retracted upward the alar cartilage is exposed. The skin on the affected side lining the anterior nostril is separated from the alar cartilage, and a cut is made across the medial crus a few millimeters behind the junction with the lateral crus. Fasten the repositioned alar cartilage securely to the normal cartilage with 2-3 chromic absorbable (gut) sutures. Sagging is prevented by inserting a mattress suture from the normal alar

cartilage directly to and through the skin in the anterior end of the vestibule of the deformed nostril. When this is tied, it forms a sling, which holds the skin and subcutaneous tissues of the nostril against the alar cartilage. This suture is a 00 chromic absorbable (gut) suture, which does not require removal. The tip of the nose is now returned to its normal position. All redundant tissue is trimmed off and the margins approximated. This operation is especially designed for a one-sided deformity.

SELTZER, Philadelphia.

RESTORATION OF NASAL CONTOUR, WITH A NOTE ON THE USE OF POLYTHENE BLOCK. C. L. HEANLEY, J. Laryng. & Otol. **68**:112 (Feb.) 1954.

Heanley has used polythene block for two years, instead of the customary bone and cartilage grafts, for the restoration of nasal contour, and has found it, on the whole, preferable. He emphasizes that it must be pure polythene, without chemical fillers. It is well tolerated by the tissues, even if there is a mild sepsis. In 30 cases, a shaped polythene block was used to restore the nasal bridge contour. In only one case, in which the mucosa was injured, was it necessary to remove the inlay. It may be sensitive to touch for a short period, but that is transitory. All edges should be rounded and the inlay placed deep, close to the bone, rather than movable in the tissue, and the inlay should be as long as possible, not just a small piece fitted into the depressed area. During the operation particular care should be exercised not to injure the mucosa when removing bone fragments. The inlay is inserted through a vertical incision in the midline of the columella. Care is taken not to allow the incision to extend upon the lip, or there may be a webbing of the nasolabial angle. If this operation is done on a young child, it must be repeated as the nose grows, using a larger inlay.

SELTZER, Philadelphia.

TRANSPALATINE APPROACH FOR CONGENITAL ATRESIA OF THE CHOANA. JOSE XIRAU, Rev. cubana oto-rino-laring. **2**:177 (Oct.) 1953.

Xirau describes his modification of the Owen's technique in using the transpalatine approach to the correction of choanal obstruction. He makes a semilunar incision from the second molar tooth on one side to the second molar on the opposite side. The mucous membrane of the entire hard palate is elevated, with the blood vessels remaining in the flap. The posterior border and hard palate are exposed and partially removed with either a gouge or a rongeur. The chonanal obstruction is thus exposed, and this is removed until the posterior border of the septum is clearly in view. The vomer is exposed by an incision in the mucoperichondrium of the septum, and if it is involved in the obstruction, it is removed. The palatine flap is replaced and sutured with 3-0 nonabsorbable surgical (silk) sutures, which are removed in five days. He presents a 9-year-old patient, in which there was an osteomembranous obstruction. There was a complete cure one and a half years after operation.

PERSKY, Philadelphia.

LATENT SINUSITIS AS A FOCUS IN CHILDHOOD. E. K. SAUTER, Deutsche med. Wchnschr. **79**:1792 (Dec. 25) 1953.

The frequency of occult sinusitis in children is given as 8 to 63%, so that routine roentgen examination of the sinuses is regarded as desirable. It has an error of between 10 and 20%. Latent mucoid hyperplastic sinusitis occurs frequently in children of the 4- to 12-year age group, although no definite statistical material is offered. The maxillary sinus is mainly concerned. The role of the sinusitis as a focus is illustrated.

AMBERG, Rochester, Minn. [A. M. A. AM. J. DIS. CHILD.].

Miscellaneous

EMOTIONAL INVOLVEMENTS IN SOME FORMS OF MUTISM. HILDA M. ADAMS and PHILIP J. GLASNER, J. Speech & Hearing Disorders **19**:59 (March) 1954.

A small number of children who do not speak show no evidence of organic involvement and are resistant to intensive speech therapy. Four nonrelated cases reported by Adams and Glasner were in children who came from severely disturbed home situations lacking any semblance of emotional and physical security. The fathers were alcoholics, and all the children were extremely

afraid of them. All utilized pantomime and sign language in attempts to communicate and under great stress were reported to utter words or short unorganized sentences. Very little success was attained in an attempt to initiate oral communications. Adams and Glasner believe that therapy should be on a psychotherapeutic level.

PALMER, Wichita, Kan.

AGRANULOCYTOSIS WITH RECOVERY FOLLOWING THE USE OF PHENYLBUTAZONE (BUTAZOLIDIN). BENJAMIN H. ARCHER and MARK G. KANTOR, New York J. Med. **54**:394 (Feb. 1) 1954.

The enthusiasm for the use of phenylbutazone in rheumatoid arthritis is now being somewhat abated because of edema, gastrointestinal upsets, reactivation of peptic ulcers, skin eruptions, and damage to the liver. Here is reported an adverse influence on the bone marrow and blood-forming elements. A woman, aged 43, had arthritis of the left knee after an initial bout in the right knee. Spontaneous relief was experienced in one week, but six months later there was a recurrence, this time in both knees and hands. A vaccine, administered subcutaneously, was tried, without relief. Then phenylbutazone was prescribed, 200 mg. t.i.d. for two weeks. There was no change in her condition. The dose was then increased from 600 to 800 mg. daily, with some immediate improvement, but after three days the patient had an acute sore throat and a temperature of 102 F. Suddenly the fever rose to 105 F., and a diagnosis of streptococcic throat was made. Then followed the administration of oxytetracycline (Terramycin), procaine penicillin in oil, and sulfadiazine, with little or no relief. (Presumably the administration of phenylbutazone had been stopped.) About six days later, the patient was admitted to the Royal Hospital, at which time the pharynx was "fiery red," with pustules generally present. From then on the picture was one of general sepsis. At this stage, procaine penicillin was administered every two hours in 1,000,000 units by hypodermic injection. It was then reduced to 1,000,000 units every four hours. Further tapering of the dosage continued until the patient became more alert and the throat improved. The patient on discharge from the hospital had improved but still had arthritis! Archer and Kantor regret that frequent blood cell counts were not made during administration of phenylbutazone. The laboratory reports showed "bone marrow depression."

ABSTRACTOR'S COMMENT: Probably every ENT specialist would recognize this as an instance of "strep. throat," but he would fortify this clinical diagnosis by making smears and cultures. It is not unlikely that this patient was a Streptococcus carrier, with the locale in the pharynx. The concomitant "rheumatism" is not accepted as cause and effect by many clinicians, but there are plenty of instances seen in throat practice which seem to verify Streptococcus as a causative agent of joint symptoms plus certain body peculiarities of the given patient. It does no harm to keep this in mind.

I. W. VOORHEES, New York.

ETIOLOGY OF LUNG CANCER: PRESENT STATUS. MORTON L. LEVIN, New York J. Med. **54**:769 (March 15) 1954.

The author of the article, Morton Levin, is Assistant Commissioner for Medical Services, New York State Department of Health. He believes that the possible etiologic factors in lung cancer are chemicals, radiations, dust or fumes encountered in occupations such as chromate production, illuminating gas production, uranium ore mining (Europe), and nickel, asbestos, and coal mining. These may be called the inhalatory group (occupational). Unfortunately, investigators have been unable to develop these lung lesions in experimental animals. The burden of present thought concerns the relationship between tobacco, especially cigarettes, and lung cancer. One conclusion seems at this time to be definite, namely, that lung cancer is found more frequently among cigarette smokers than among nonsmokers. In men, this rate in smokers is 15 times greater than in nonsmokers. There is, as yet, no absolute proof that tobacco in any form is the sole cause of cancer of the lungs. So many variables enter in that no scientific conclusions can be postulated. However, "lung cancer is a rapidly increasing cause of death in this country." It exceeds tuberculosis in New York State in this regard. The causes must be considered mutiple and contributory until a specific constant factor is determined. "In less than a decade, the chance of developing lung cancer at some time during life has more than doubled among males in New York State. Two per cent of all males may be expected to develop lung

cancer at the present rates of incidence." This is a careful and complete study of the problem as it is known today; but researchers are still unable to be entirely definite, and so further investigations must go on. Morton Levin includes seven tables and 12 references in his text, which merit careful reading.

I. W. VOORHEES, New York.

METHOD OF REMOVING LESIONS OF THE LID MARGINS. R. E. STRAITH, Plast. & Reconstruct. Surg. **12**:291 (Oct.) 1953.

Since wedge-shaped resection for removal of the margin of the lid often results in a depressed surgical scar, Straith prefers a skin incision parallel to the lid margin, since it follows Langer's lines. With the usual incision for removal of excess skin of the lower lid, approximately 2 mm. of lower lid margin are removed on each side of the tumor. The reflected skin flap is made as thin as possible, about that of a full-thickness graft. The tumor is removed by a wedge resection and the cut muscle bundles approximated with fine white nylon sutures. The same material is used to approximate the tarsal plate and the skin edges. The horizontal wound is then closed with a running 5-0 nylon subcuticular suture, advancing the excess skin laterally and removing it so that the lateral scar will be in one of the normal wrinkles at the corner of the eye.

SELTZER, Philadelphia.

FURTHER OBSERVATIONS IN CLEFT LIP REPAIRING. K. M. MARCKS, A. E. TREVASKIS, and A. DACOSTA, Plast. & Reconstruct. Surg. **12**:392 (Dec.) 1953.

Marcks and his associates continue an earlier report on their method of repair of cleft lip. The emphasis is on the use of a Z-shaped wire to outline the incisions to be made in the lip. The use of the wire is chiefly to insure accuracy of position and length of the incisions, and they find that calipers can answer a similar purpose, after one becomes familiar with the type of Z-incision which is made. The point of the operative technique is that the opposing Z-outlines shall fit into each other, like pieces in a jigsaw puzzle, which requires very exact measurements, to insure perfect apposition. The operation is described in detail and accompanied with five drawings and 25 photographs, which clearly illustrate the method presented.

SELTZER, Philadelphia.

ALLOY STEEL SUTURES IN THE REPAIR OF CLEFT LIP AND CLEFT PALATE. O. P. LARGE, Plast. & Reconstruct. Surg. **12**:403 (Dec.) 1953.

Large finds advantages in the use of fine, stainless steel wire as suture material in cleft lip. One reason for the preference is that with sutures which have to be removed there is frequently a separation of the edges of the wound, which necessitates a second operation for their closure. With the stainless steel wire, the ends of the wire are cut very short and can be left in place permanently, since the material is soon covered in by the growth of mucous membrane. There is very little tissue reaction, and the objectionable features of nonabsorbable (silk) and absorbable (gut) surgical sutures have been almost entirely eliminated. These are suture marks on the skin of the lip and an indurated, fibrous subcutaneous tissue reaction. With fine-pointed, heavy, curved suture scissors, the ends of the wire can be cut short on the knot.

SELTZER, Philadelphia.

EARLY AND LATE REPAIR OF FACIAL DEFECTS FOLLOWING TREATMENT OF MALIGNANCY. F. X. PALETTA, Plast. & Reconstruct. Surg. **13**:95 (Feb.) 1954.

Paletta emphasizes that, while the eradication of cancer is the primary objective of its treatment, the repair of the defects which follow is also of considerable importance. The various types of operations for the repair of a variety of conditions following removal of malignant tissue are reviewed. In all of them, the underlying rule is that the simplest repair that simulates the tissues reconstructed would be the method to choose. Free, full-thickness grafts from the supraclavicular area and local adjacent flaps are best for smaller defects. Langer's lines should be followed, and muscle and nerve continuity should be preserved. For larger defects, pedicle flaps are derived from the neck, chest, or arms. For the nasal alae or the columella, composite grafts from the ear are suitable. Twelve cases are presented, including the lip, lower eyelid, nose, palate,

and cheek. Five of the cases were repaired immediately following excision of the tumor; two were provided with prostheses, and five were repaired later. There are excellent photographs to illustrate the lesions.

SELTZER, Philadelphia.

BRONCHOGENIC CARCINOMA. ALTON OCHSNER, Select. Writ. Ochsner Clin. **12**:9 (Dec. 31) 1953.

The author feels that otolaryngologists should take a realistic view of the effects of cigarette smoking, since it appears that many in this field frequently maintain that smoking causes no irritation of the respiratory tract. He states that cancer is a disease of older people and that all cancers of the body except bronchogenic cancer increase with advancing age, in both men and women. From his observations and studies he finds that there is a distinct parallelism between the sale of cigarettes in the United States and the incidence of bronchogenic cancer. It is a disease primarily of men (90%). The upper lobes are primarily involved, and the lesions may not be visible on bronchoscopy. In his series, the main-stem bronchus was involved in 4%, the lobe bronchus, 60%, and the peripheral bronchus, 36%. Adenocarcinomas develop from a congenital rest and may appear early.

He urges a thorough investigation in any case of cough (all smokers cough) and hemoptysis (due to ulceration). Wheezing demands investigation.

Roentgenography will give an accurate diagnosis and should be undertaken without delay. Also, cytological examination of the bronchial secretions has given the highest percentage of positive diagnosis.

The author, a renowned surgeon, who is William Henderson Professor of Surgery and Chairman of the Department of Surgery, School of Medicine, Tulane University of Louisiana, closes his detailed article with the following poignant warning: "In conclusion, I would like to emphasize again that this is a disease which is increasing more rapidly than any other cancer. You, as otolaryngologists, have a real responsibility because of the large number of smokers with a cough and throat irritation who consult you. I know many of you smoke.

"I don't imagine any of you will discontinue the habit because of what I have said today (This article was read by invitation at the 57th Annual Meeting of the American Laryngological, Rhinological and Otological Society, Inc., New Orleans, April 28, 1953.), but I would urge that each of you who smokes get an x-ray of the chest every six months, or preferably every three months so that when you develop your cancer it can be detected at the time when it is still localizing. It is extremely desirable to make a diagnosis of bronchogenic carcinoma early, even before symptoms arise.

"In our series in which only six were symptomless, resection was possible in only 33 per cent, and the lesion was limited to the lung in only 8.5 per cent as contrasted with the finding in a small series of cases seen by Overholt in which malignant lung lesion was diagnosed before symptoms developed. In all these cases the lung was resectable and in 75 per cent the lesion was limited to the lung."

GORDON, Philadelphia.

PULMONARY RESECTION IN THE FIRST YEAR OF LIFE. E. S. CROSSETT and R. R. SHAW, Surg., Gynec. & Obst. **97**:417 (Oct.) 1953.

Six case reports indicate the value of pulmonary resection in infants under 1 year of age. Congenital pulmonary cysts should be differentiated from pneumothorax and can be successfully removed. Localized hypertrophic emphysema and localized fetal atelectasis not responding to conservative therapy can be treated by segmental or lobar excision. Bronchiectasis associated with fibrocystic disease of the pancreas offers the poorest prognosis, because of the chronic progressive nature of the primary disease. The surgery in infants can be performed with a high degree of safety in these days of improved technique, antibiotic therapy, and increased knowledge of respiratory physiology.

FRIEDBERG, Chicago.

Books

Essays on the Applied Physiology of the Nose. By Arthur W. Proetz, Professor of Clinical Otolaryngology, Washington University School of Medicine, and Fellow of the American Laryngological Association. Second edition. Price, $8.00. Pp. 452, with 130 illustrations. Annals Publishing Company, St. Louis, 1953.

The author asks what can be said of a second edition save that it is revised, simplified, modernized, and embellished. He adds that the favorable reception given to the first edition, which appeared in 1941, made this second one possible. Proetz was a devoted pupil of the pathologist of New York City, the late Jonathan Wright, to whom the book is dedicated and whose photograph appears on page xxii.

This is an exhaustive and scholarly study, which must have required many years in preparation. The copyright is in the author's name, not that of the publisher. Every rhinologist has perfected himself in the subject of nasal anatomy, but how many have been greatly concerned with nasal physiology? It seems abstruse and difficult, and it is a sort of intangible, "ungetatable" subject. Out of the 21 chapters, it is rather surprising to find 4 devoted to cilia. Most rhinologists, perhaps, can tell all they know about cilia in a single sentence, but Proetz considers the morphology, action, growth and regeneration, and physical and chemical effects of cilia. These tiny, hair-like objects are said to be defensive against all foreign bodies, including, of course, bacteria, but are they? Anyone who has ever had "a cold" may doubt this. One would prefer to believe that the enormous outpouring of secretion at such times favors ejection of all intruders, but it often fails.

The rhinologist is concerned chiefly with nasal obstruction, due to either the hard parts, osseous and cartilaginous, or the soft parts—temporary or radical changes in both anatomy and physiology. Surgical corrections have been well studied and have given great relief to patients, but when the specialist is confronted with secretory conditions, the worst of which is probably atrophic rhinitis, he is often in a quandry. What can he do, for instance, with a condition in which the secretion sticks like glue, is removed with difficulty, resists all medication, and keeps on forming to the patient's discomfiture and loss of faith in his counselor?

Chapter 16 discusses nasal mucus and viscosity but does not tell how to manage it, perhaps because this is not a book on treatment. But one would like to know more than that mucus is composed of "Mucin, 2.5-3%; Salts, 1-2%, and Water, 95-97%." The physiological chemist should have done better; in fact, they must do so if the rhinologist is going to find ways and means of restoring something like normal nasal function, which means sufficient moisture but neither copious outpouring nor scabs and crusts. This is no fault of Dr. Proetz, who has studied all of the literature thoroughly. The truth is that the facts have neither been determined sufficiently nor written down for the edification of the rhinologist. Let the youthful laboratory researcher who thinks that "everything has been done" take a hint. He may well devote a lifetime to this problem.

Chapters on the sense of smell, neural reactions, the influence of climate and environments, air currents and air pressures make this book comprehensive, scholarly, and readable. Much of it is based on questions asked by students, and that is, after all, the way of the masters of teaching, who always encouraged interrogation not only by students but by themselves of themselves. This is a good book.

The Relations of Hearing Loss to Noise Exposure. Exploratory Subcommittee Z-24-X-2 of the American Standards Association, Z24 Sectional Committee on Acoustics, Vibration, and Mechanical Shock. Price, not given. Pp. 64. American Standards Association, Inc., 70 E. 45th St., New York 17, 1954.

This is a report prepared by the Subcommittee Z-24-X-2 of the American Standards Association, formed primarily to explore the relations between hearing loss in industrial workers and exposure to industrial noise. The minimum objectives were to determine the problems involved

in the reliable measurement of hearing loss resulting from exposure to industrial noise and the difficulties that stand in the way of establishing criteria for the protection of hearing. Although the expressed purpose was exploration, the report itself reveals trends, concepts, and conclusions of considerable significance. It is an astute, cautious, and painstaking analysis of data obtained from numerous industries, principally by Dr. Wayne Rudmose and Dr. Walter Rosenblith, of the Committee.

The criteria for usability of the data were based on rigid requirements for audiometry, spectral and temporal noise characteristics, duration of exposure, and no previous exposure to intense noise. Tens of thousands of audiograms were taken in industry, but on the basis of the criteria, the data from only nine plants were at all usable, and these presented about 7,000 audiograms. Furthermore, only a single plant provided any substantial amount of data that met the criteria of acceptability, and of the hundreds of audiograms taken in this plant, less than 200 met the necessary criteria for the basis of the detailed report and analysis in this brochure.

Since the investigators had no means of determining the role of temporary threshold shift in the data obtained, they were not able to evaluate this entity and, consequently, labeled their results "not corrected for temporary threshold shifts." The authors, incidentally, are acutely aware throughout the report of the limitations of their results and concepts as well as of the numerous and complex aspects inherent in the problems they are attacking.

In order to separate the effects of noise from presbycusis, the authors derived presbycusis curves from the data obtained in three large-scale surveys. These curves relate the average hearing loss to be expected with age. The authors also realized the shortcomings of these curves and emphasize the limitations of their use. The authors feel that hearing losses from noise and presbycusis are additive and that there is no interaction between them.

The detailed study presented is then based on some 200 audiograms satisfying rigid criteria on subjects who had been daily exposed to a single kind of continuous noise for a period of 2 to 44 years. From these data, trend curves are developed representing the authors' best estimate of the average net hearing loss to be expected from continuous exposure to steady noise of certain characteristics. A clear understanding of the limitations of this method is essential prior to using the trend curves to estimate hearing losses in practical situations. They apply only to steady state noise and continuous exposure. They are corrected for presbycusis but not for temporary threshold shifts.

A study of airline pilots indicates that intermittent exposure is less dangerous to hearing than continuous exposure to the same noise. Individual differences in susceptibility are present in all the studies. The most rapid shifts in threshold with exposure time were encountered in drop-forge operators. Losses in hearing were found for frequencies as low as 1000 cycles after two years' exposure.

The authors also describe the many unsolved problems still existing in this field. They urge caution in the use and interpretation of their report.

Directory of Otolaryngologic Societies *

FOREIGN AND INTERNATIONAL

Canadian Otolaryngological Society

(Société Canadienne d'Otolaryngologie)

President: Dr. D. E. S. Wishart, 170 St. George St., Toronto.
Secretary: Dr. W. Ross Wright, 361 Regent St., Fredericton, N. B.
Place: Minaki Lodge, Minaki, Ont.

International Bronchoesophagological Society

President: Dr. André Soulas, 184 Avenue Victor Hugo, Paris 16.
Secretary: Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40.
Meeting: Third International Congress of Bronchoesophagology.
Place: Lisbon, Portugal. Time: Oct. 10-13, 1954.
President of Congress: Dr. Iberto Luis de Mendonca.
Secretary of Congress: Dr. Antonio Da Costa Quinta, Avenida de Trinidade, Lisbon 20.

International Congress of Audiology

Place: Leyden, Netherlands.
General Secretary: Dr. H. C. Huizing, 182 Oostersingel, Groningen, Holland.

International Course in Paedo-Audiology

Place: Groningen, Netherlands.
General Secretary: Dr. H. C. Huizing, 182 Oostersingel, Groningen, Holland.

Pan-American Association of Oto-Rhino-Laryngology and Broncho-Esophagology

President: Dr. Juan Manuel Tato, Azcuenaga 235, Buenos Aires, Argentina.
Secretary: Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40.
Meeting: Fifth Pan-American Congress of Oto-Rhino-Laryngology and Broncho-Esophagology.
Place: San Juan, Puerto Rico. Time: February, 1956.
President of Congress: Dr. Juan H. Font, Medical Arts Building, San Juan.

Sixth International Congress of Otolaryngology

President: Dr. Arthur W. Proetz, 3720 Washington Blvd., St. Louis.
General Secretary: Dr. Paul H. Holinger, 700 N. Michigan Ave., Chicago 11.
Place: Hotel Statler, Washington, D. C. Time: May 5-10, 1957.

NATIONAL

American Medical Association, Scientific Assembly, Section on Laryngology, Otology and Rhinology

Chairman: Dr. Francis W. Davison, Geisinger, Memorial Hospital, Danville, Pa.
Secretary: Dr. Hugh A. R. Kuhn, 112 Rimbach St., Hammond, Ind.
Place: Atlantic City, N. J. Time: June 6-10, 1955.

* Secretaries of societies are requested to furnish the information necessary to keep this list up to date.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

President: Dr. Walter H. Theobald, 307 N. Michigan Blvd., Chicago 1.
Executive Secretary-Treasurer: Dr. William L. Benedict, 100-1st Ave. Bldg., Rochester, Minn.
Place: Waldorf-Astoria Hotel, New York. Time: Sept. 19-24, 1954.

AMERICAN BOARD OF OTOLARYNGOLOGY

President: Dr. Frederick T. Hill, Professional Building, Waterville, Maine.
Secretary-Treasurer: Dr. Dean M. Lierle, University Hospitals, Iowa City.
Examinations: Waldorf-Astoria Hotel, New York, Sept. 13-17, 1954; Hotel Marshall, Richmond, Va., March 6-10, 1955; Palmer House, Chicago, October, 1955.

AMERICAN BRONCHO-ESOPHAGOLOGICAL ASSOCIATION

President: Dr. Clyde A. Heatly, 11 N. Goodman St., Rochester, N. Y.
Secretary: Dr. F. Johnson Putney, 1719 Rittenhouse Sq., Philadelphia 3.
Place: Hollywood Beach Hotel, Hollywood, Fla. Time: March 15-16, 1955 (afternoons only).

AMERICAN LARYNGOLOGICAL ASSOCIATION

President: Dr. Henry B. Orton, 224 Delavan Ave., Newark 4, N. J.
Secretary: Dr. Harry P. Schenck, 326 S. 19th St., Philadelphia 3.
Place: Hollywood Beach Hotel, Hollywood, Fla. Time: March 13-14, 1955.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

President: Dr. Kenneth M. Day, 121 University Place, Pittsburgh.
Secretary: Dr. C. Stewart Nash, 708 Medical Arts Bldg., Rochester 7, N. Y.
Place: Hollywood Beach Hotel, Hollywood, Fla. Time: March 15-16, 1955 (mornings only).

SECTIONS:

Eastern.—Chairman: Dr. Daniel S. Cunning, 118 E. 53rd St., N. Y. 22.
Place: Hotel Syracuse, Syracuse, N. Y.
Southern.—Chairman: Dr. William C. Wolfe, 332 W. Broadway, Louisville 2.
Place: Andrew Jackson Hotel, Nashville, Tenn.
Middle.—Chairman: Dr. French K. Hansel, 634 N. Grand Blvd., St. Louis 3.
Place: The Drake, Chicago.
Western.—Chairman: Dr. Guy L. Boyden, 1735 N. Wheeler Ave., Portland 12, Ore.
Place: The Elks Club, Los Angeles.

AMERICAN OTOLOGICAL SOCIETY, INC.

President: Dr. D. E. Staunton Wishart, 170 St. George St., Toronto 5, Canada.
Secretary-Treasurer: Dr. John R. Lindsay, 950 E. 59th St., Chicago 37.
Place: Hollywood Beach Hotel, Hollywood, Fla. Time: March 17-18, 1955.

AMERICAN OTORHINOLOGIC SOCIETY FOR THE ADVANCEMENT OF PLASTIC AND RECONSTRUCTIVE SURGERY, INC.

President: Dr. Matthew S. Ersner, 1915 Spruce St., Philadelphia 3.
Secretary: Dr. Louis Joel Feit, 66 Park Ave., New York 16.
Place: Waldorf-Astoria Hotel, New York. Time: Sept. 19, 1954.

AMERICAN SOCIETY OF OPHTHALMOLOGIC AND OTOLARYNGOLOGIC ALLERGY

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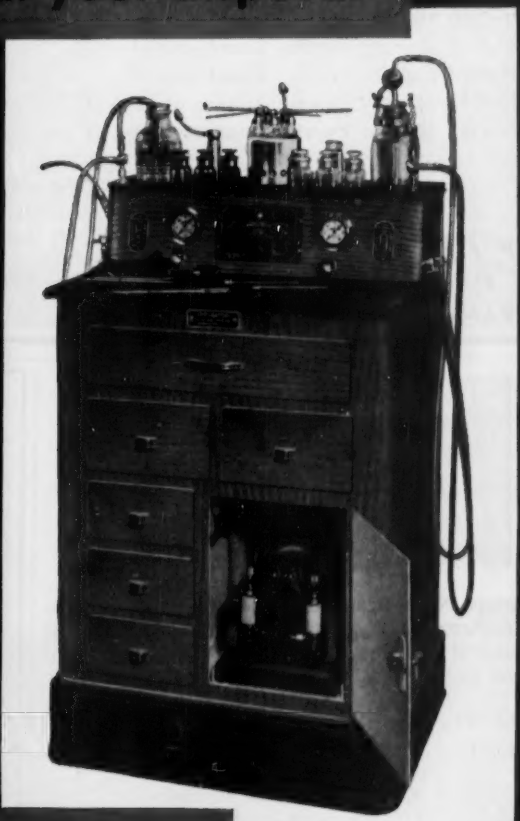

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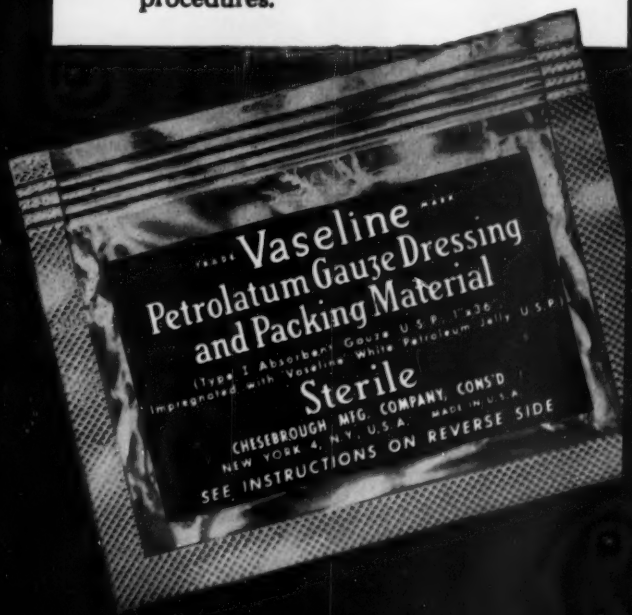

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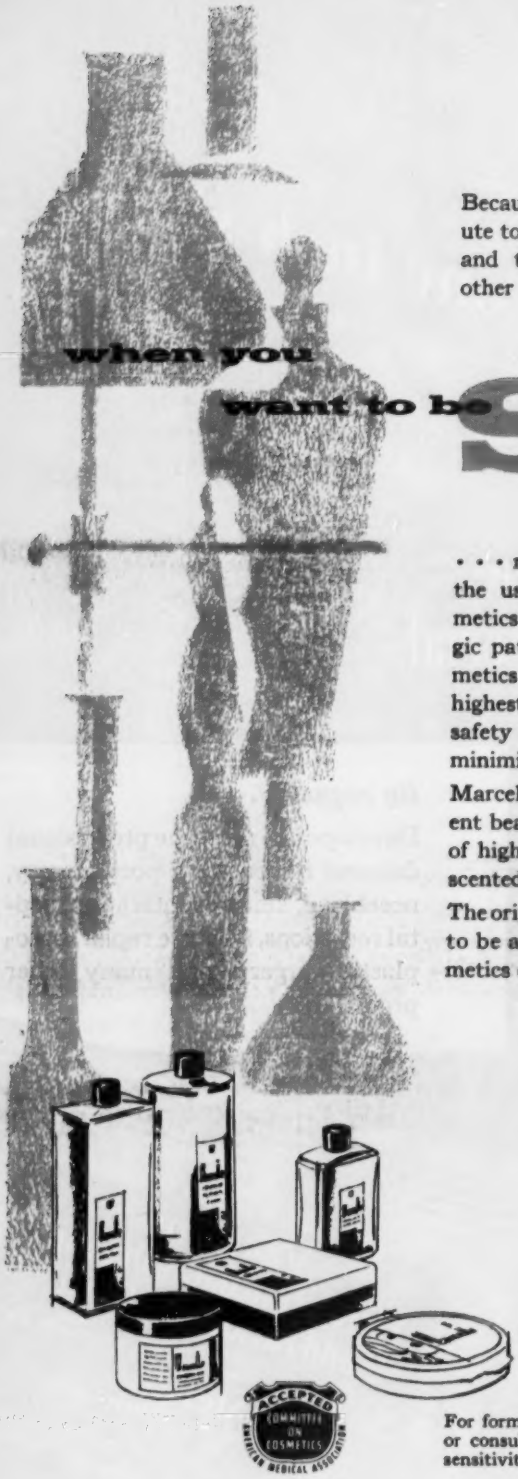

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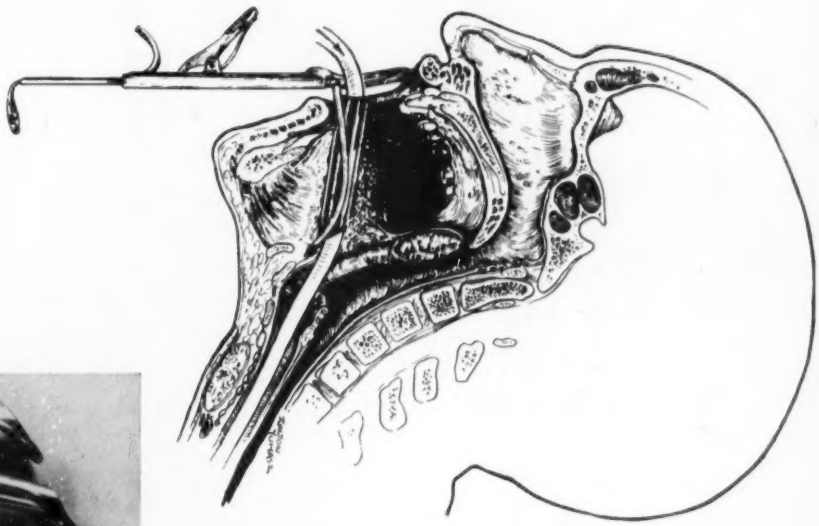

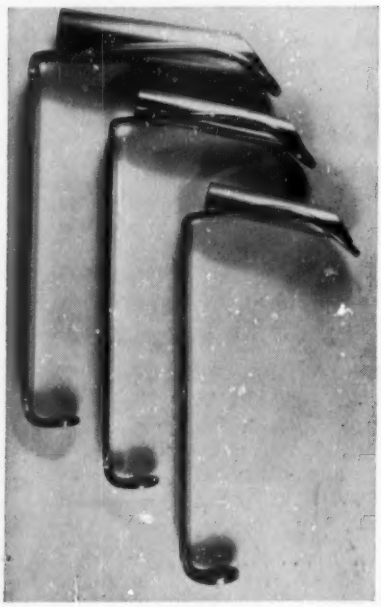

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*Barton, R. T.: Instrument for endotracheal anesthesia during oro-pharyngeal surgery. J. A. M. A. 153:1017 (Nov. 14) 1953.

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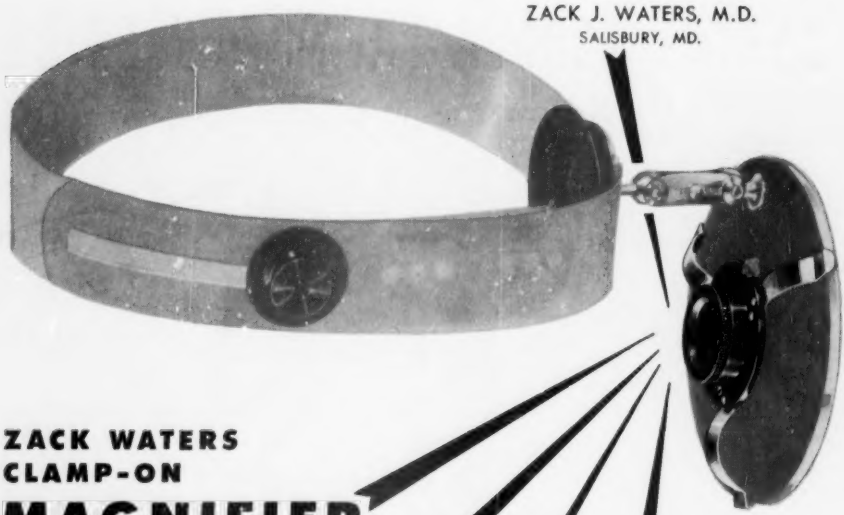

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